VOL. VIII MAY 1957 NO. 5

UNITED STATES ARMED FORCES MEDICAL JOURNAL

Published Monthly by
the Armed Forces Medical Publication Agency
Department of Defense

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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1957

THE PRINTING OF THIS PUBLICATION HAS BEEN APPROVED BY
THE DIRECTOR OF THE BUREAU OF THE BUDGET, 20 FEB. 1956

Monthly Message

I have recently read the book, *Social Science in Medicine,* by Leo W. Simmons, Professor of Sociology, Yale University, and Harold G. Wolff, Professor of Medicine (Neurology), Cornell University Medical College, published by the Russell Sage Foundation in 1954. I commend it to all of you.

In the chapter dealing with "Hospital Practice and Social Science Perspective," there is this statement:

> We are now ready to conclude that medicine is potentially a social as well as a physical science and that successful medical practice depends on the former as on the latter disciplines.

Although applicable to all of us in medicine, this becomes especially important for you who are with the Armed Forces where the problems dealing with sociology, social science, disrupted backgrounds and traditions, and new environments and social groups have a profound effect upon those who come to you for treatment. Frequently these sociological factors may well prove to be the initiating or continuing causes in a physical or organic ailment. Treatment for this latter by itself may be entirely unavailing or only temporarily helpful unless the total sociological picture is considered. This applies not only to the dependent families but also to the members of the Armed Forces themselves.

These outside factors of social group and environment may play important roles in the health and behavior of the individual soldier, sailor, or airman as regards his daily life, in sudden changes in his action, or as to causation of serious or even fatal accidents.

Frank B. Berry

FRANK B. BERRY, M. D.
Assistant Secretary of Defense
(Health and Medical)

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Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal.*

FRANK B. BERRY, M. D.,
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UNITED STATES ARMED FORCES MEDICAL JOURNAL

Volume VIII May 1957 Number 5

DOCTOR SAMUEL ADAMS

Revolutionary Army Surgeon and Diarist

THOMAS M. HUNTER, *Ph. D.*

SAM ADAMS, of Boston Tea Party fame, has long obscured another Sam Adams who, besides being almost as intimately connected with Revolutionary politics as his illustrious kin, was equally as dedicated to the struggling American medical science. This is Dr. Samuel Adams (1745-1819) who was born in Connecticut but who lived most of his life in Massachusetts and Maine. His autographed manuscript diary, 1758-1819, in the Manuscript Division of the New York Public Library,* is probably the most important and extensive medical diary extant of the 18th century and the beginning of the 19th in the United States. Adams started his diary with his *Puerile Diary* on 12 March 1758, at Killingly, Conn., at the age of 13 and ended it on 24 February 1819, at Bath, Maine, at the age of 74.

From History Department, Pottsville Center, Pennsylvania State University, Pottsville, Pa.

*Besides the Samuel Adams diary in the New York Public Library, there are a few other known Adams papers. The Massachusetts Historical Society holds 12 items, 1774-1783, relating to inoculation hospitals, hospital conditions, lists of surgeons in military hospitals, prescriptions and provisions, camp news, and army life. These are mostly in the Artemas Ward, William Heath, J. C. Warren, and Henry Knox papers. The Boston Medical Library has one letter about Adams' daughter Clementine's death on 31 January 1815. The Manuscript Division of the Library of Congress has one item, a letter from Adams to a Mr. Hubbard, dated 28 October 1782, concerning an order for vinegar for the hospitals at Boston and vicinity. The notebook, "Lying-in Cases by S. A.," is in the Historical Library of Maine. The Manuscript Division of the New York Public Library also has the diary of Adams' son John for the years 1797-1800, 1805-1808. This consists mostly of entries about the weather, boating trips, and the theater of that day in Boston. The theater entries are interesting and informative about the plays then current in Boston. Like his father, John had a philosophical turn of mind, and commented from time to time on the foibles of mankind and the futility of life.

At the end of 1768, Adams compiled a volume of extracts from his diaries of the first 10 years and destroyed the originals. Except for the years 1788, 1803, 1804, and half of 1789, however, the daily entries in the series are present from 1768 to 1819. On almost every title page (fig. 1), he professed to intend the diary only for his own use. He wrote about 1,000,000 words on more than 3,000 small octavo pages.*

Nevertheless, as extensive and as varied and colorful as the diary is, it is apparently relatively little known. Quite possibly, however, Adams' painfully diminutive and sometimes obscurantist handwriting, plus occasional code, simple though it is, would overawe even the most interested reader.

Samuel Adams' quest for professional growth in a then limited science happened to coincide with the troubled Revolutionary period. He started his life and career at the end of a transitional period in both the medical profession and colonial life. After a period in new England, when the clergy ministered to the bodily as well as the spiritual needs of their parishioners, prescribing mustard or hell-fire as the case required,[1] and when frequently the most able medical men were newcomers from Europe rather than American-born, physicians were coming to regard their practice as a profession in itself. John Mitchell, Royal Society; William Douglass, Leyden and Paris; and Cadwallader Colden, Edinburgh; all European-born, had already distinguished themselves. Jared Eliot and Zabdiel Boylston, native-born, were rising to prominence.[1]

The status of medicine in America in Adams' time was far below that of the science in Europe. The usual method of securing a medical education was by apprenticeship to a practicing physician. Boys from 14 to 17 might serve an apprenticeship of 4 to 7 years. Even those of good family had to do all kinds of menial work besides, and, as in Adams' case, to tend the apothecary shop which was quite frequently an adjunct of the doctor's office. The centers of medical education were Leyden, Paris,[1] and Edinburgh. The first American to take his medical degree in Europe was William Bull of South Carolina in 1734.[1,2] The medical department of the University of Pennsylvania was not founded until 1765, the Massachusetts Medical College (Harvard) in 1782.[3] Dissections were scarcely performed in the colonies before 1760, and then by stealth.[1] There were few hospitals. There was the Pennsylvania Hospital, founded in 1755 through the efforts of Dr. Thomas Bond, Sr., and Benjamin Franklin, and one

*Descriptive material and extracts which accompanied the Adams diary from the dealer when purchased by the New York Public Library.

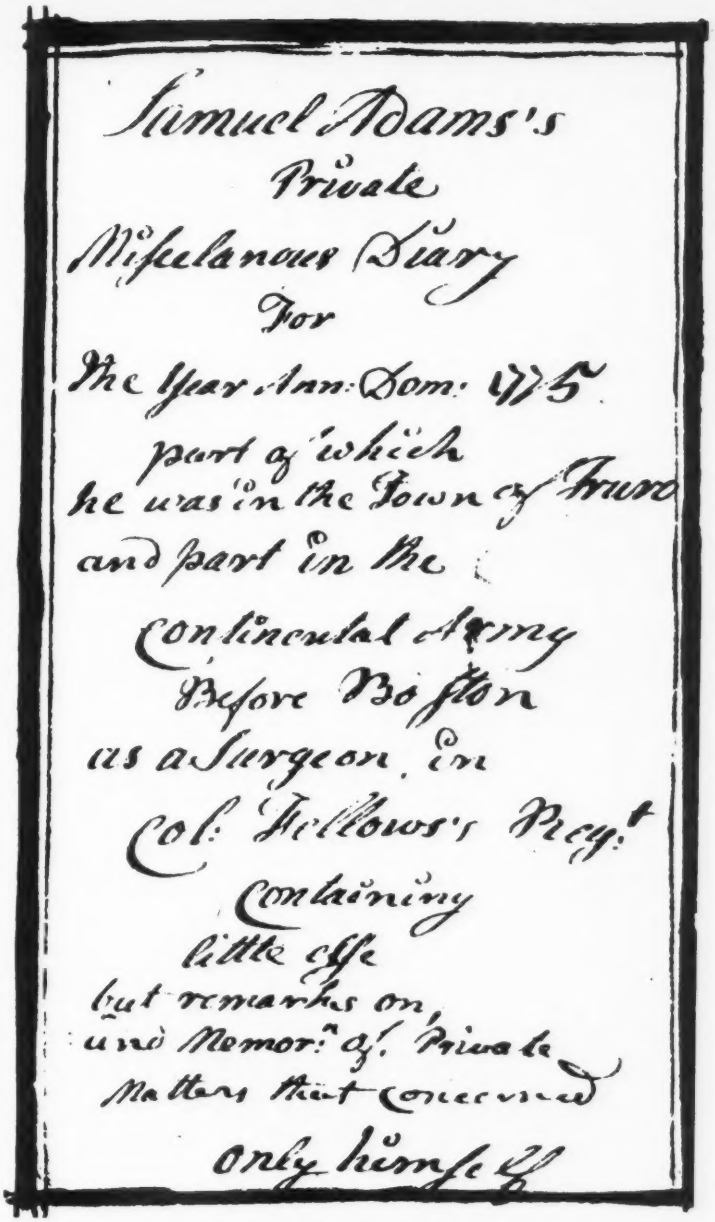
Samuel Adams's
Private
Miscelanous Diary
For
the Year Ann: Dom: 1775
part of which
he was in the Town of Truro
and part in the
Continental Army
Before Boston
as a Surgeon in
Col: Fellows's Regt
Containing
little else
but remarks on
and Memor: of Private
Matters that Concerned
only himself

Figure 1. Title page, diary 1775.

in New York in 1771, destroyed by fire and rebuilt in 1774 but mostly used for barracks purposes.[4] Obstetrics, in which Adams took a keen interest, did not become a part of the doctor's studies until after the middle of the century. Midwifery was completely a woman's domain.

While Samuel Adams did not embody the 17th and early 18th century concept of the doctor combining his practice with divers other occupations, at one time or another he was not only a country practitioner and Army surgeon but a teacher and tavern keeper as well. His commentaries are many, varied, and rich. His record is extensive and diverse. In this respect, he deserves to be ranked with his more famous Adams kin whose diaries are so currently newsworthy.

In the common practice of the day, Samuel Adams also sought to set down in his *Anatomy and Commonplace Book* all of the knowledge obtainable in his day. He was an avid collector, as well, of medical recipes. He seems, in fact, to have recorded every conceivable kind of sense or nonsense. Even considering some of the fantastic compounds in use in his day, and it must be remembered that the 18th century was as much an age of quackery as of reason, Adams must have had doubts as to the efficacy of some of the proposed remedies. Many of these miscellaneous and questionable, and anything but scientific, medical recipes were simply taken from an old *Anatomy and Commonplace Book* of Dr. David Sharrows. We must remember too that medical concepts of that day were based on a mêlange of ancient beliefs, founded in magic and religion, hidebound tradition, and doctrines which were formulated by authorities over the centuries and accepted more for that reason than through any scientific testing. A typical recipe is, "Good dung mingled with vinegar and a little bran and applyed as a plaister to a sore breast catcheth wonderfully all swellings thereof." We need not wonder so much at this, however, for, though earlier, William Penn, certainly a highly intelligent man, had included in his book of *Physick* a terrific concoction of butter, black snails, rosemary, lavender, elder, new cow dung, and new hen dung for bruises.[1] A remedy for hiccups was, "Stop both your ears with your fingers and the hiccough will go away." For "ringworms," the prescription was, "Take Vitriol all two drachms and dissolve it in a pint of clear water and with the water wash the hands it will cure ringworms better & scales in the same." To test fertility, "Let a woman make water in a urinall that is clean upon some barley corns and set the same in a cold place 8 days and if the [illegible] barley corns will grow again then the fault is not in the woman that she conceives not but in the man if otherwise than the fault is in her."

There was a liberal mixture of astrology also with this kind of medical practice. "Let the physician take heed," was the warning, for example, "of his first visiting of the sick in the hour of Saturn and Mars if he come to him in the hour of Saturn either the sick will dye or else the physician shall have great labour doubts & [illegible] in the caring of him if in the hour of Mars there will be chidings and brawlings between him & the sick party & shall gain the hours of Jupiter & Venus are much praised the hours of the other planets are indifferent." One was to be particularly wary of Venus, however, when it came to receiving money, for, "He that receiveth a sum of money in the hour of Venus will spend the same with women in pleasure and wantonness."

Dr. Adams also extracted from the manuscript of Dr. Nathaniel Freeman, his mentor, who, in turn, had extracted it from an old manuscript of a Dr. Cobbs, dated Barnstable, 4 December 1739, the following calendar of medical treatment:

January—let not Blood nor physick this month unless some extraordinary occasion require it and beware of taking cold for Rheume and phlegms do much abound this month.

February—if Necessity urge you may let Blood but be sparing in physick till March or April.

March—now is the time to let Blood and Humours encrease.

April—now purge and bleed the pores are yet open let Blood three months the moon being in Cancer or Taures it is Extream perilous for the moon to be in ye same sign that rules the member in which the vein is opened. Best to take purges when the moon is in Cancer. Ointments or plaisters best applyed when the moon is in the same sign that rules the member to which it is applyed.

May—(blank)

June—(blank)

July—abstain from physick unless Necessity urge.

August—observe the same & letting blood

September—is a good time to use physick and phlebotomy as the opening a vein to discharge some of the blood.

October—physick is to be used also this month.

November—(blank)

December—the best physick this month is wholesome diet warm cloaths good cyder or beer and a carefull loving wife.

In allusions to his love affairs, and subsequent marriages, sometimes by the repetition of certain initials in the lower right corner of his daily diary entry, or an occasional *scandale* in code, Samuel Adams' diary is much like that of the famous Samuel Pepys. He appears to have married five times and to have had 15 children. He first married Deborah Larned on 21 March 1764. The first child died of a "Hooping cough," and Mrs. Adams died of "a consumption." Adams next married Abigail Jordan on 19 July 1773. She died on 8 July 1774, in childbed. On 1 August 1776 he married Sally Preston, who died on 24 September 1787 after an extended illness. The *Adams Genealogy* records Samuel Adams marriage to Abigail Dodge on 29 June 1789. This is perhaps an error in the year, for there is no corresponding diary entry for that date. Abigail also died, and Samuel last married Mary Ann Bent on 10 May 1815 at the age of 70, and had one daughter by her.

Samuel Adams was born on 28 January 1745, in Killingly, Conn., to Michael and Sarah Shuttleworth Adams.[5,6] His father was a direct descendant of the first Henry Adams who came to America in 1636.[7,8] At the age of 17, Samuel Adams set out to be a foot soldier. He drew bounty on 11 May and joined Captain Spaulding's company of the regiment of Colonel Phineas Lyman at Plainfield on 19 May. Adams' regimental commander was then gaining a reputation, during the Seven Years' War, as the most able and trustworthy provincial general throughout the northern colonies and was even approved of by his British superiors at the same time that he was working to maintain the independence of his colony. Dressed in "the finest coat ever seen at New York," he sailed to join Albemarle in the expedition of provincial troops to Havana.[7] The young, impressionable Samuel Adams was no doubt greatly influenced in his political views by this able, young patriot. Physically, however, he suffered badly from the expedition and returned from it in very poor health. It was only during the following year that he recovered his health sufficiently to start studies at Killingly with Dr. Nathaniel Freeman,[7,9] another ardent patriot who, as Lyman, almost lost his life at the hands of Loyalists. Adams left home on 7 December and began his studies at Killingly in March. Between 28 October and 10 November, he studied under a Dr. Ironwood. Then, on 12 January 1764, he began teaching school for a Mr. Turner.

On 3 September 1766, Adams went to Sandwich, Mass., located on Cape Cod Bay. Two days later he began the study of Physick under Dr. Freeman. He read a great deal from the works of the celebrated Hermann Boerhaave of Leyden, but he read mostly in the field of military medicine. There were few books on the subject then available in the colonies, except for the British

authority Sir John Pringle's *Observations on the Diseases of the Army* and the writings of Gerard Van Swieten. Van Swieten was a Viennese professor of surgery who wrote an important work on the hygiene of troops in camp[10] which, in the American edition, first appeared in Philadelphia in 1776, apparently for hasty use by the Revolutionary troops. Dr. Freeman served as Adams' mentor and took him along when he visited his patients. Inasmuch as the duties of apothecary and physician were not divided until later decades,[1] the young medical student spent many hours in what appears to have been Dr. Freeman's apothecary shop. Here he compounded the popular "potions," "infusions," and "electuaries" of the time.

Young Sam Adams was also being trained in pre-Revolutionary politics as well as medicine. His mentor, Freeman, was later persuaded by his great-uncle, James Otis, Sr., to read law. Freeman emerged as an able and prominent young patriot and became the moderator in Sandwich town meeting. He moulded patriotic sentiments and restrained the activities of the more spirited of his pro-British neighbors.[7] Adams did not study law or become a magistrate, as Freeman, but he otherwise followed suit.

In April 1769, Samuel Adams began the practice of medicine at Truro, Mass., near Cape Cod. He resorted frequently to the common practice of blood-letting, extracted teeth on many occasions, and endlessly prescribed cathartics such as sal ammoniac and diaphoretics for fever, elixirs such as antimony for female disorders, and varied tinctures and cordials for the stomach. A typical diary entry is, "September 12, 1769—Fair weather. Visited Mr. Knowles boy who had cut off a finger. Dressed it as a simple wound & extracted a tooth for Mr. J. Athens wife—gave Nitric & Calom. to Mr. Nicholson little girl for worms."

Adams' interest in childbirth was lively, and he kept precise accounts. He sought constantly to facilitate rapid delivery. Part of his diary entry of 26 December 1771 is rather illegible, but it shows the care which Adams exercised and the skill which he must have had in child delivery.

. . . was called about sun up to [illegible] in Falmouth in travail with her fifth child arrived about 10 O'clock found (by Mrs [illegible] the mid wife) that she was taken in Labour about [illegible] the membrane broke while she sat before the fire and the waters discharged her pains had been hard but not frequent all night—upon examining I found the os externum and internum fully dilated. [illegible] finding the hand without the os internum and the funis umbilicus fallen down behind it the child's hand to the mother's right [illegible]. I introduced my left hand the woman lying in a supine position under the arms to the childs [illegible] which with the hand I [illegible] as much as I could to the

[illegible] for the feet which not without difficulty I brought down to the os internum then introducing my other hand and around [illegible] the head—while with my left hand I gently pulled the feet and to my joy the arm extended into the [illegible] I then waited for a Labour pain which forced down the child with the hips without the os externum & finding the pains did not force enough to bring the child without bringing down the arms I introduced my finger and brought them down over it [illegible] minding to turn the forehead into the hollow of the sacrum and putting my finger into the mouth brought out the head with a [illegible] it was a very large girl [illegible] woman comfortable—the operation lasted 40 minutes.

In Ipswich between 1782 and 1796, Adams attended 485 women in childbirth and never once used the forceps, nor did he lose a single mother. From the time that he moved to Bath, Maine, in 1796 until his death in 1819, he attended an additional 1,115 deliveries. He recorded all of these cases between 1782 and 1819 in his extensive notebook, *Lying-in Cases by S. A.*,*—briefly, usually, but always plainly. He was ready to go almost anywhere. There were instances of births at the Isles of Shoals off Portsmouth, and Wood Island at the mouth of the Merrimack.

Sometimes he was called so late that the patient was close to being in extremis. He reported an earlier case, on 27 May 1772, of an expectant mother who had been in strong convulsions for some time and who died after Adams had delivered a live baby. When he first saw her, every symptom seemed to indicate that she was dying. He supposed the woman to be about seven months gone with child. "Let her blood," he says, "ordered a clyster—gave nervous medicine and an opiate but gave no relief—introduced hand in uterus. Shoved up the child's head brought down the feet and delivered with care a fine girl alive."

Adams was called upon for his obstetrical services by people far and wide. He attended the wives of Dr. Nathaniel Weld and Dr. Timothy Waldron of Bath. There are few other traces in Maine medical history to be found of these cases. Little otherwise is known of some cases, however, for, according to his *Lying-in Cases*, Adams kept a separate account in great detail of his most difficult obstetrical cases, but, though the search has been intensive, this second notebook has never been found. In the first notebook, he told of his meeting his own fourth wife who had brought into the world 14 children. Of his own children, he never mentioned more than eight from four wives. In his practice, twins were not uncommon. Occasionally, labor was tedious, but usually

*In Maine Historical Library, the gift of Mrs. Hartley Baxter of Brunswick. Quoted from in Spaulding,[5] *Maine Physicians of 1820*, in the library of the Maine Historical Society.

it was rapid. Although often short, the umbilical cord was more often very long. Frequently, and in curious manner, it was convoluted around the neck, body, and arms. Adams noted the cases of two children born with six fingers and toes on each hand and foot. On others, there were a few instances of supernumerary fingers. Infants weighed from three pounds to eleven and three-quarters. In a case of eclampsia with convulsions, Adams noted that, "All the women in the room and house were frightened at nothing," but that he finally brought the patient around all right by giving opium abundantly. Many times at the end of a delivery, Adams would add: "Went home at last; mother and baby doing well." He did most of the midwifery in Bath for many years. He had one rival, an Old Granny Lombard, who for a silver cart wheel (silver dollar) would bring an infant into the world. She had enough common sense, though, to know just when to get her dollar, then to give Dr. Adams a chance to earn his five and travel costs and to finish the case properly.[5] On more than one occasion, Adams had incognito patients as private boarders in his home. One time, he carried the child in the night to elsewhere in the community to be suckled for five shillings per week.

By 1770, Adams was becoming involved more deeply in pre-Revolutionary politics. He was a dedicated patriot. While at Truro, he was quite active in controlling the few Tories of the neighborhood. He recorded the Boston "Massacre" on 16 March 1770 as follows: "Fair. Dressed foot wound. Received Newspapers on account of the unhappy affair with the soldiers. Vid. B. Gazette. March 12, 1770." He attended annual commemorative services for this occasion in later years. On 1 June 1774, he bitterly described the blockade of Boston Harbor (fig. 2)

On 2 July, Adams' first son was born but died on the last day of the month. He described his wife's sickness and death with agonizing detail from 3-8 July.

By fall, stirring meetings were being held about Tea and Tories, and Adams was sometimes the clerk. On 22 October 1774, Adams recorded: "S. Cloudy somewhat. Went to Captain Jonthan [illegible] Freeman's & to sundry other places among the shops. Died this morning Mr. Willm. Mollineaux greatly lamented by the Whigs but to the joy of the Tories." He attended the Mollineaux funeral on 24 October and the next day visited Faneuil Hall for a town meeting. He saw General Gage and noted that, "Gen. Gage has nothing majestic or thinking in his person. His person does not bespeak him capable of the great business he is bent upon."

Adams' mentor, Dr. Freeman, now suggested that Adams apply for a warrant of surgeon. In the spring of 1775, Adams visited the army at Cambridge and saw General Washington, with whom he

June 1774

1st W. fair - Visited Mr Jo.a Paine set a visit from her
11.th Adams quitted Coat N.A. —

This Day was put in Execution the unjust &
oppressive act of Parliament for Blocking up
the Harbour of Boston - behold in this act an
enormous Stretch of arbitrary power by which the
property of the brave & worthy Bostonians are
wrested from them - we have here the determination of Ad-
ministration to enslave America. Will not the brave
Patriots of Farmington be justified by all well wishers
to their country in Resolving that the Parliament
of Great Britain was instigated by the Devil to pass
the S. Act & may we not add that they have hereby
proved themselves to be of their Father the Devil &
that his works they do and will not that detestable
: ble, Hypocritical, Inveterate & Infernal Enemy
to his Native Country that could with the Abridg-
: ment of English Liberties to be highly desirous
the bitterest Cups of all Succeeding Generations
as through his means this heavy calamity has come
upon us — — —

Figure 2. This day was put in execution the unjust & oppressive act of Parliament for Blocking up the Harbour of Boston—behold in this act an enormous stretch of the arbitrary power by which the property of the brave & worthy Bostonians are wrested from them—we have here the determination of Administration to enslave America. Will not the brave Patriots of Farmington be justified by all well wishers to their country in resolving that the Parliament of Great Britain was instigated by the Devil to pass the S. Act & may we not add that they have hereby proved themselves to be of their Father the Devil & that his works they do and will not that detestable, hypocritical, inveterate & infernal enemy to his native country that could with the "Abridgement of English Liberties & be highly desirous the bitterest cups of all succeeding generations as through his means this heavy calamity has come upon us."

was frequently in company later. He recorded the battle of Bunker Hill on 17 June. On 7 July, a board of surgeons appointed by Congress and consisting of Drs. Benjamin Church, John Taylor, David Jones, William Whiting, William Bayless, Jeremiah Hall, William Dinsmore, and Samuel Holten* examined Adams and gave him a warrant of surgeon the following day. Adams could be called "Mister" or "Doctor," but there was no rank with his commission.[4] He was assigned to the 18th Regiment of Continental Infantry[11] under Colonel Edmund Phinney at Roxbury. He served from 1 January to 31 December 1776.**

The news of the evacuation of Boston by the British army was music to Adams' ears. On 17 March 1776, he wrote:

> The British army in Boston under General Howe consisting of upward of 7000 men after suffering an ignominious blockade for many months past this day disgracefully quitted their Strong holds in Boston & Charlestown and precipately fled from before the Army of the United Colonies & took refuge aboard their Ships—a detachment of our Army under Genl Putnam took possession of the Town of Boston with all its important Posts in the name of ye 13 United Colonies of North America—another detachment of Bunker Hill . . . .

In April, the smallpox broke out in the army and became epidemic. On 17 July 1776, Adams wrote, "Came into town in the morning—found the town under Inocculation about 8000 persons having received the small pox in that way." Even several months previously he had mentioned sending various men to the smallpox hospital at Howell's point. He also recorded a number of private inoculations, some in code, as 10 April 1776: "D4ct SpglO 1384156H2d pg3vite6y f49 thz Sml66 p4x [Doctor Spiro inoculated privitely for the small pox]." The descriptive material with the Adams diary states that Adams confirms the report which was circulated that the British had sent an infected Indian to Boston to spread the smallpox, but, after an exhaustive search, I have not been able to find such a specific diary entry. Assuming that such a report was circulated, Adams possibly gives some credence to the report when he says on 27 July, "An Indian fellow died with small pox." Whatever may be the facts of the story about the infected Indian, smallpox was a scourge to the health

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*Adams just mentions Drs. Church, Taylor, Jones, and Holten, and the committee appointed by Congress. The complete names of these doctors and those of the committee members have been taken from Duncan,[4] Appendix B, "List of Medical Men Who Took a Part in the American Revolution," pp. 379-414 and p. 40 for the examining committee.

**A diary title page of Adams' mentions service under a Colonel Fellows before Boston in 1775. This is not listed in the Surgeon General's Records[11] as official service and must have been before Adams was given a warrant of surgeon by Congress.

and morale of the army. It was even more destructive than British bullets during the first two years of the war.[12] It has been said, however, that there was little suffering at Boston, this in spite of the fact that Dr. John Morgan was opposed to inoculation.[4] The little suffering was probably due, therefore, to the systematic efforts of medical men such as Adams who believed that inoculation, "heroic" weapon though it was, would prove to be effective. During the summer of 1776, it was generally being applied. Washington is said to have been inoculated.[4] Adams not only mentions the inoculation hospitals in his diary, but there are two letters in the Dr. Samuel Adams papers of the Massachusetts Historical Society which relate to the establishing of inoculation hospitals.

From these concerns, Adams now momentarily turned to marry again. He married Sally Preston on 1 August, but he was soon back with the army. Seven days later, be marched with his regiment to Ticonderoga. Supplies were frequently short, but, on 7 September, they finally reached the fort. Six days later, he reported the battle on Lake Champlain. He was kept busy with the sick and the wounded from the battle of 13 October. He recorded in his diary the loss of the Royal Savage. On 23 November, he set out for Lake George.

Adams participated both in the campaigns in New York and New Jersey, and in December 1776 he transported the sick to Albany and received a leave of absence. Everywhere he went, he noted the customs and habits of the people. He was no doubt already familiar with the beadle in early churches who carried the collection bag on a large pole, but when he visited the Dutch church at Albany and saw the collection bag on a stick with bells, he thought that it was worth recording in his diary.

From time to time, Adams went on leave from the army to visit his family or to move their residence. Wherever he was, though, he showed his endless curiosity. On 9 January he wrote, "Somewhat cloudy but not so as to hinder seeing the Eclipse of the Sun." Between 1-5 February 1777, he moved his residence from Truro to Dorchester, south of Boston.

During 1778, Adams was frequently on the move. He took the time, however, on 3 January 1778, to dissect a dog, but he tells nothing more of it than just that. On 17 March 1778 he recorded, "Cold with some squall of snow. Dined at his Excellency Gen. Washington's headquarters. Middle Brooke." On 14 May, he joined the 3d Continental Artillery Regiment[11] under the command of Colonel John Crane. The colorful Crane, one of the Sons of Liberty, had also been one of the Boston Tea Party Indians. While down in the hold of one of the ships he had been knocked senseless by a chest of tea. His companions, believing him

dead, had concealed him under a pile of shavings in a nearby carpenter shop. Crane had a sturdy constitution, though, and recovered. On 1 January 1777, he had taken command of the 3d Artillery Regiment which served as a detachment under Sullivan in the Rhode Island campaign. He received honorable mention under Gates at Saratoga and in the defense of Red Bank.[7]

In June, Adams journeyed into the Pennsylvania German country. He visited Bethlehem and wrote in his diary about the customs and habits of the Moravians. He was especially impressed by their quiet and civil manners, their ingenuity, industriousness, and thrift.

This was just an interlude, however, because of the rapid acceleration of military movements. On 5 June Adams marched to Morristown. On 17 June he wrote, "Air very hot. Crossed Sullivan's Bridge over Schuylkill and got into camp at Valley Forge about 10 o'clock. Dined at Gen'l. Knox's." He reported the engagement at Monmouth and had the care of the sick at Englishtown. "Our army," he says on 29 June, "after burying the Dead, taking care of the wounded we left at night marched back to Englishtown. I went over the field of battle. A shocking sight!" On 13 July he assisted Dr. Charles McKnight,* a New York surgeon, in sawing off part of the fibula of Captain Thomas Arnold's leg and later helped Dr. McKnight to amputate it.[13] "The ball," he said, "was lodged in the center of the tibia, which bone was fractured badly." All compound fractures at that time, except those of the hip joint, called for amputation, and Adams concluded that there was no possibility of saving the leg. He thought, in fact, it a pity that this had not been recognized and the leg amputated before.

During 1779, there was a period of relative quiet and inactivity in Adam's service. When he was not attending the sick, he spent much time in reading in bed, which was the warmest spot in a room without a fire. He played a lot of backgammon which he called the "ministerial game of Back gammon." On 6 August he visited the artillery and found them afflicted with nothing more serious than bugs. The report of this, which soon made the rounds of the camp, and which Adams recorded in his diary in code, provided much merriment to a dull camp life.

The years of 1779-1780 were bitter, frustrating ones for Adams. He no longer wrote of "the brave and worthy Bostonians." He now referred to them as "smug Bostonians." As many army men,

*Adams only mentions a Dr. McKnight. This could only have been Dr. Charles McKnight, because he was the only medical man by that name in the American Revolution.

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Adams had received little or no pay. He engaged in constant wrangling with the legislature for back pay. The currency was depreciated. Prices were skyrocketing. A pound of butter was a dollar. A hat sold for as much as $1,000, and Adams paid $250.00 per week for board for himself and his family. Adams was progressively becoming disillusioned.

On 9 April 1780, he received a leave of 60 days. He was in desperate financial circumstances. By 24 April 1780, Adams let himself go in a tirade against his previously "brave and worthy Bostonians." He wrote in his diary 24 April 1780, "Went to Boston with Mrs. A—went to a great number of places on business—the currency depreciated to almost nothing—it seems to me the people are all mad,—would to God they were all obliged to serve in the army as private soldiers one winter and fare as the troops did last winter in West Point—it might, I think bring them to reason . . . ." Two days later, he continued, "This day by order of Congress observed as a day of fasting and prayer throughout the united States—could not attend Meeting for want of cloaths to appear decent—brought to this in the service of my country!!!"

Adams' bad temper about the especially seamy sides of the war was temporarily mollified during 1780 and 1781, possibly partly because of his being made a hospital physician and surgeon on 6 October 1780, and partly because of his intimacy and conviviality with Washington, Lafayette, and other high-ranking persons. On 26 December 1780, he wrote, "Dined at his Excellency Genl. Washington with Genl. Howe, Col. Schernel, Doct. Cochran—good dinner—excellent glass of wine—very agreeable company—spent evening in reading in the Boston Chronicle for 1767." Yet, the instinctive bitterness remained and soon cropped up again. On 1 January 1781, General Knox entertained all officers of the Brigade at dinner. "We were a sett of poor miserable boys without a single shilling in our pockets—consider this ye money catchers at home, and think what you deserve for your sordid avarice, and your treatment of your army."

By 5 February, Adams' drooping spirits revived again. On that day, he wrote, "Cleared away last night—fair day—much warmer than yesterday—walked to the Park, exceeding bad walking, visited my Patients all doing cleverly—Dined at Head Quarters, New Windsor—Marquis de La Fayette, General Clinton also there—exceeding good dinner—Wine excellent! enjoyed myself well—Miss Hamilton present, pretty little Brunette much fine in her eye . . . ." This camaraderie had its effect. While he deplored the general attitude of the public, Adams held his respect for the leaders of the army. He later named a son for Henry Knox, general of the artillery command under which he served. During

August 1781, he was received again by General Knox. "Waited on Genl Knox," he wrote, "was received cordially as I could wish for."

Disillusioned as he was, Adams did not resort to corresponding with the enemy as Benedict Arnold. Adams rather fully relates the news of Arnold's treason in 1780, and he was completely unable to understand how Arnold, after having served his country with a bravery that bordered on madness, could now turn to the enemy. He concluded that "an accursed thirst for gold" was the only thing that "would [have] induce [d] him to . . . overturn that cause in which he had fought so bravely!"

Adams had been granted a 70-day leave of absence on 21 February 1781. There was a growing doubt in his mind that he should remain in the army. He took to lobbying while attempting to get his back pay from the government. Apparently it was necessary to get a petition through the legislative houses before payment could be made. Adams' petition passed one house, but failed in the other. He was enraged to the breaking point and wrote in his diary, "I had the satisfaction to speak my mind freely on the affair and among many other things I told several of the Senators before a number of witnesses on the floor of the State House that what they had done was worse than High way Robbery —which they swallowed tolerably easy—oh! the Brutes!—stupid low-liv'd D---ls!" By August, Adams was thoroughly discontented and tired of war. Between 22-27 August, he was at Verplanck's Point and West Point. On 4 September, he noted in his diary that he was even unable to pay the postage on a letter from his wife.

The war news gave a lift now, however, to Adams' shattered morals. On 24 September 1781, he recorded, "A report prevailed yesterday and this day that in an action between the British and French fleets off the Chesapeake, the latter were completely victorious, that the British had two ships fired three run aground and four taken—that this has caused the greatest consternation in N. York, and that they are preparing to evacuate it—a glorious affair. God grant it may prove true and that this campaign may be the last of the war . . . ." The tide of victory was turning quickly now, and, on 28 October Adams wrote, "Authentic intelligence arrived here this evening that on the 19th inst. two of the enemies redoubts at York Town were stormed one by the French the other by the Americans and carried with little loss, that hostilities ceased on the 19th and on the morning of the 19th Lord Cornwallis marched out with his army when 3400 reg troops grounded their arms, 2000 more were sick & wounded in the hospitals."

Shortly thereafter, Adams became ill. He secured a leave of absence from 6 December to early April and returned to his family

on 16 December. He set up housekeeping in Boston, undoubtedly with a view to keeping an eye further on the legislature. On 11 July 1783, he resigned his commission.

During this time, besides trying desperately to get his back pay, Adams looked about for a town in which to resume private practice. A Dr. Manning, probably John Manning, an Army surgeon of Massachusetts, proposed a partnership in Boston to Adams. Adams rejected it. Instead, he removed to Ipswich, in northeastern Massachusetts, to continue private practice.

Samuel Adams' diverse interests never failed him. He entertained President Washington on his passage through Ipswich on 30 October 1789. On 20 December he was at Boston and went aboard the new India ship of 800 tons, built at Braintree for Shaw and Randall to be used in the Canton trade.

The immediate years which followed were seemingly rather quiet ones so far as the practice of medicine was concerned, and Adams turned to tavern keeping for several years. In 1792, he leased Treadwell's tavern house for three years from 1 May at 45 pounds per year. On 19 April, he also agreed to attend the poor of the town for 25 pounds and 15 shillings. He commenced tavern keeping on 10 May, but it does not appear to have been rewarding in any particular sense, unless it was the satisfaction which Adams undoubtedly received from the atmosphere of a public house.

At some point during these years, Adams decided to journey to Maine with a view to moving there. General Knox, Colonel Phinney, and other military officers of his acquaintance seem to have urged and advised him to do so. They knew that he was unusually capable and might find more opportunities for advancement there. It is also possible that Mrs. Adams helped to prompt him, inasmuch as she was from Portland. Between 29 February and 1 May 1796, he journeyed to Maine and rented a house at Bath for $40 per year. He sailed with his family for Bath on 6 July. In 1799, he was said to be living on Washington Street.*

Samuel Adams spent the rest of his life in country medical practice. He was the only physician in Bath. The next physician, Dr. John Stockbridge, did not settle in Bath until 1813.[14] Adams wrote in his diary about family life, current events, social affairs, his medical practice, work in the kitchen garden, now his main hobby and his fondest, and, finally, the weather, his

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*Letter from Mr. Henry W. Owen, Jr., author of *The Edward Clarence Plumer History of Bath, Maine*,[14] May 18, 1956. Mr. Owen says, "Dr. Adams, according to Levi P. Lemont, resided on Washington Street, in 1799."

lifelong interest. On 7 January 1800, he took part in a procession in memory of George Washington. He was one of the contributors to the fund for the purchase by the North Church in 1803 of the Paul Revere bell. The bell now hangs in the belfry of the Bath City Hall.[14] On 2 February 1804, he was made a Fellow of the Massachusetts Medical Society. He was active in Masonic affairs, being a charter member of the Solar Masons, F. & A. M., founded in Bath in 1804. In 1805-1806, he was its second master, succeeding General William "Sultan" King,[15] wealthy shipowner and the first governor of Maine.[7] Although the records are fragmentary, Adams was paid by the town of Bath in 1811-1812 to be in attendance upon the poor. He was also one of several gentlemen who were incorporated by the General Court under the title of Trustees of Bath Academy. This was the Female Academy which later became Bath High School.*

Age was no barrier to Adams' interest in marriage and family life. After the loss of his fourth wife and children Albert and Clementine during these years, at the age of 70, he married Mary Ann Bent by whom he had a daughter Julia Ann. On 21 November 1816, he had his likeness made by Benjamin Greenleaf,** the popular but rather peculiar portrait painter, educator, and author of important mathematical textbooks. Greenleaf lived with the Adams family. Adams wrote in his diary, "I had my likeness taken by a Mr. Greenleaf who came to our house on Monday last." Greenleaf, as was the custom of the times among artists, was no doubt off on a rambling itinerary of portrait painting. Just what he received as remuneration for his portrait of Samuel Adams is hard to say, but Adams was determined to get his board money. He wrote on 14 December, "Mr. B. Greenleaf board settled up to this day—ballance of all accounts. Board begins anew from this morning."

Samuel Adams' diary entries were gradually tapering off. In October 1817, he visited friends and relatives in Boston, Andover, and Ipswich. His daughter Julia Ann was born on 13 June 1818. On 25 February 1819, he characteristically but symbolically wrote the last entry in his diary. "Cloudy," he wrote. Nine days later, Dr. Samuel Adams was dead.

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*See footnote on p. 640.

**This Greenleaf portrait may no longer be in existence. It is not listed with known Greenleaf portraits (reference: "1440 Early American Portrait Artists, 1663-1860," preliminary volume compiled by The New Jersey Historical Records Survey Project, WPA, Newark, N. J., The Historical Records Survey, 1940) and an extensive search by the author has produced no lead as to its existence or location. It may have been lost by being broken. This is what happened in at least one known instance, and is unfortunate because Greenleaf was an accomplished limner on glass. He is said to have lived in Phippsburg, down the river from Bath, Maine, 1810-1817, according to a letter from Carl N. Schmalz, Jr., Curator of Bowdoin College Museum of Fine Arts, July 10, 1956.

Samuel Adams was a physician when earnest efforts were being made to strengthen the scientific basis of medicine. He is said to have been "the most intelligent and successful practitioner in the state of Maine" in his day. This is probably true. He was undoubtedly highly regarded in Massachusetts as well. It was not an easy time, however, in which to grow professionally. Beneath the troubled political events of the Revolutionary era, America was experiencing a cultural undercurrent. It no doubt even helped to mould the political events, but political nationalism took precedence over cultural nationalism. The physician, nevertheless, was emerging as a professional man, and his social standing in the community depended largely upon his medical success. In his time and place, Samuel Adams was a success.

The era of Samuel Adams was a transitional one, and much yet remains to be known about it. Samuel Adams did not achieve eminence as, say, John Morgan, Edward Shippen, or Benjamin Rush of the Revolutionary generation. He was in many ways, though, more fortunate than they. He did not become involved in the violent medico-political conflicts of the day as they. Adams' diary simply reveals the life and work of a physician of varied interests and inquiring mind, who tried especially to improve obstetric procedures before there was even such a phase of medical study. As an Army surgeon, he gave some of the best years of his life to the service of his country. As a hospital surgeon, he sought to improve hospital facilities and administration. It was a day when medical men had too few facts with which to work. They tried, nevertheless, to apply logic to what facts they did have. Tentative as much of it was, an increasing pursuit of science was going on in America. This growing interest in science and its influence upon Revolutionary America and subsequent history, is only now coming to be known. Samuel Adams belongs to that formative period in American history.

REFERENCES

1. Adams, J. T.: *Provincial Society,* 1690-1763 (History of American Life, Vol. 3). Macmillan Co., New York, N. Y., 1927. pp. 60-62; 124; 125; 269; 126.

2. *New England Genealogical and Historical Register,* Vol. XLI, pp. 391-392.

3. List prepared by Dr. James Couper, New Castle, Delaware, chairman of committee appointed by the National Medical Convention to report on medical schools. First published in the *American Journal of Medical Science.* Reprinted in *The Western Lancet* 6: 57-58, May-Dec. 1847.

4. Duncan, L. C.: *Medical Men in the American Revolution,* 1775-1783. Medical Field Service School., Carlisle, Pa., 1931. pp. 8; 19; 16.

5. Spaulding, J. A.: *Maine Physicians of 1820: A Record of the Members of the Massachusetts Medical Society Practicing in the District of Maine at the Date of Separation.* 1928. pp. 10; 21-23.

6. Adams, A. N. (editor): *A Genealogical History of Henry Adams and His Descendants.* Tuttle Co., Rutland, Vt., 1898. pp. 320, 328.

7. *Dictionary of American Biography.* Vol. I, p. 72; Vol. VII, pp. 12-13; Vol. XI, p. 517; Vol. IV, pp. 505-506; Vol. X, pp. 405-406, Vol. VII, p. 581.

8. Historic Adams papers: a first view. *Life* 41: 66-76, July 2, 1956.
9. Thacher, J.: *American Medical Biography* Vol. II, pp. 244-246, 1828.
10. Van Swieten, G.: Kurze Beschreibung und Heilungsart der Krankheiten welche am oftesten in dem Feldlager beobachtel werden (A Short Narrative and Treatment of the Illnessess which were most frequently observed in the Camp). C. Wien, Prag u Triest, 1758, Philadelphia, 1776, and Boston, 1777.
11. Surgeon General's Records, "List of Officers of the Medical Department, 1775-1892," Record Group 112, Entry 84, National Archives.
12. Gibson, J. E.: Smallpox and the American Revolution. *General Magazine and Historical Chronicle* 51(No. 1): 55, Autumn 1948.
13. Heitman, F. B.: *A Historical Register of the Officers of the Continental Army During the War of the Revolution, 1775-1783.* The Rare Book Shop Publishing Co., 1914. p. 76.
14. Owen, H. W., Jr.: *The Edward Clarence Plumer History of Bath, Maine.* Times Co., Bath, Maine, 1936.
15. Reed, P. M.: *History of Bath and Environs* (Portland, 1894). pp. 383-384.

THE SPIRIT OF INQUIRY

"The spirit of inquiry is admirable if it is really inquiry and not uncritical novelty worship. It is right that we should examine and consider every new thing that is presented to us, but not necessarily right that we should adopt it. Most new things turn out in the end to be wrong. When presented with a new project for acceptance, we should first ask: 'Is it reasonable?' Then, 'Is it really new? Has it, or anything like it, been tried before? If so, has it failed, and why? Was the failure due to some inherent defect, or to some circumstances that can now be remedied? If it is reasonable but yet untried, can it be tried without risk? If there is a risk, how can that risk be eliminated or minimised? Are we justified in a full-scale trial, or should we first try a pilot experiment? Can the experiment be done first on ourselves?' "

—SIR HENEAGE OGILVIE
in *Lancet*
p. 115, Jan. 21, 1956

THE ROENTGEN DEMONSTRATION OF DUODENAL ULCER

EDWARD R. HEITZMAN, Jr., *Captain, USAF (MC)*

RECENT reviews concerning the military effectiveness of ulcer patients made by Palmer, Sullivan, and Hamilton[1-3] indicate that the problem of duodenal ulcer in the armed services is one of greatest importance. The age incidence of duodenal ulcer and the fact that it is four times as common among males as among females predisposes military populations to this disease. Sherman's[4] recent article concisely summarizes some of the important points that indicate the magnitude of the ulcer problem. He emphasized the high incidence of ulcer and the fact that this incidence is increasing. He also pointed out the extensive morbidity and the significant mortality arising from this disease. The number of man-hours lost due to ulcer is overwhelming. The possibility of sudden perforation, hemorrhage, et cetera, is always present, and among key personnel, particularly those who fly, may result in tragic accidents.

In many instances, the diagnosis of duodenal ulcer can be made with assurance from clinical symptoms and findings alone. Many times, however, the presenting complaints are bizarre. Several other conditions may simulate the ulcer syndrome closely. Indeed, some of those individuals with the most typical ulcer syndrome subsequently are shown to be suffering from a condition other than ulcer. Many times the distinction between gastric ulcer and duodenal ulcer cannot be made clinically, yet this is an absolute necessity because the course of each disease is so different.

Most of the upper gastro-intestinal series on military personnel are performed with the differential diagnosis of ulcer in mind. It, therefore, seems obvious that the examination of the upper gastro-intestinal tract for ulcer must be regarded as an examination of utmost importance. Hodges has emphasized this by stating: "Haphazard, superficial or careless examination of patients has no place in the search for these lesions and can do much harm by providing erroneous opinions in whichever direction the error is made. An incorrect diagnosis of duodenal ulcer may sentence a patient to a

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prolonged period of unnecessary invalidism and restricted opportunity in life. Failure to recognize the lesion when present provides a false sense of security which may well be rudely interrupted by the totally unexpected development of one or another of the common and frequently tragic complications of the disease. Actually, inexpert examination is less than valueless; it is an inexcusable imposition upon trusting patients."[5]

Nevertheless, despite the most skilled examination of the upper gastro-intestinal tract, it is stated by many authors that evidence of duodenal ulcer can be found in only 50 to 60 per cent of patients with an actual ulcer. Bockus[6] believes that, if one included all types of duodenal deformities and marginal defects, approximately 90 per cent of ulcers would be revealed by roentgenographic examination. It seems worthwhile, therefore, to review the primary and secondary findings in duodenal ulcer and to emphasize certain technics by which ulcer may be diagnosed with greater accuracy. In this review, pyloric ulcer and postbulbar ulcer are excluded as constituting special problems; however, most of the subsequent statements apply equally well to these lesions.

It is hoped that these points will be of some interest to those doing radiologic work in the armed services where, due to the relative shortage of radiologists, some roentgenographic examinations must, of necessity, be done by general medical officers with a limited background in radiologic technic and experience.

ROENTGEN SIGNS OF DUODENAL ULCER

Correlation of radiographic findings in duodenal ulcer with gross and microscopic pathologic findings is difficult to obtain because many patients with duodenal ulcer are never operated on. In fact, many of the patients operated on have subtotal gastrectomy performed without excision of the duodenal ulcer. In many cases technical difficulties preclude an accurate visual examination of the region of the duodenal bulb at operation. Nevertheless, over the years certain types of roentgenologic findings have become relatively well standardized and can be relied on with considerable certainty.[7-11]

It should be emphasized that active duodenal ulcer can be diagnosed with 100 per cent certainty only when the actual crater is demonstrated. This is the only sign pathognomonic of ulcer. It has been stated that an attempt should be made to visualize the ulcer crater *en face* and in profile on every examination (fig. 1). Frequently, this is not possible, and a clear-cut demonstration of the crater in either of these two projections is sufficient to make a definite diagnosis.

When an actual crater cannot be demonstrated, the diagnosis of an active duodenal ulcer can often be made accurately on the

basis of so-called secondary signs. These secondary signs may be grouped into findings indicative of consistent bulb deformity and findings indicative of bulb irritability or spasm, bulb tenderness, and secondary gastric changes.

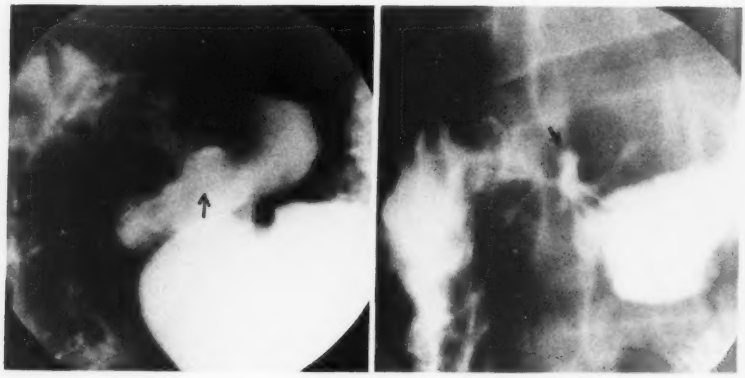

Figure 1. Ulcer crater or niche on the anterior wall seen en face *(left) and in profile (right).*

Deformities of the duodenal bulb may take many forms. Among these are the so-called half-bulb deformity, fir-tree deformity, and the mid-bulb constriction referred to as the clover-leaf or necktie deformity. Other significant deformities are the incisura, radiating folds, microbulbus, prestenotic diverticulum, eccentric pylorus, et cetera (fig. 2). These deformities appear to be the result of mucosal edema coupled with a certain amount of muscular spasm within the duodenal cap. Fibrosis may play a role in lesions of longer standing, and some of the more chronic deformities may be due to periduodenal adhesions. Under certain circumstances any of these findings may be present in a chronically scarred bulb in which no active ulceration is present. However, any of the bulb deformities should, when found, indicate a very careful examination in a search for the actual ulcer crater. If a crater cannot be demonstrated, the evaluation of irritability or spasm of the duodenal bulb becomes of importance in indicating whether an active inflammatory process is present.

Evidence of spasm or irritability will be noted only on careful and relatively prolonged visualization of the duodenal bulb. If the duodenal bulb never fills out well during the period of observation and passes barium through at a very rapid rate, some spasm may be inferred, although some exceptions to this statement will be encountered. Spasm of the pylorus is a frequently encountered problem and is not necessarily indicative of a pathologic condition in the duodenum. Various maneuvers may be carried out in order to relieve the pylorospasm. The greatest success in over-

Figure 2. Common duodenal deformities. Arrows point to associated ulcer craters. Each of these deformities may be the residual of a healed ulcer but, when seen, should indicate that a careful effort be made to demonstrate an active crater.

coming it has resulted from placing the patient on the right side for a few moments. Occasionally it is necessary to discontinue the examination for a period of several minutes. When pylorospasm is present, duodenal ulcer should be suspected; Bockus stated that actual hypertrophy of pyloric muscle is seen in duodenal ulcer. Without other corroborative evidence, however, pylorospasm is a nondiagnostic finding because it can be found in many subjects without organic gastro-intestinal lesions. Certain drugs have sometimes been administered to overcome pylorospasm, but this is very rarely necessary.

Careful palpation should always be carried out in an effort to elicit consistent tenderness in the region of the duodenal cap. Active ulceration within the duodenal cap may be suspected if consistent tenderness in the region of the bulb is elicited during palpation in various positions. Certain patients may fail to admit pain even when it is present because they realize that loss of job opportunity or other adverse circumstances may result from the establishment of an ulcer diagnosis. This is particularly true among those who fly, since the establishment of a definite ulcer diagnosis may result in the loss of flying status. However, even consistent tenderness is of little significance unless correlated with other roentgenographic evidence.

The gastric signs of duodenal ulcer have been referred to by many authors. Essentially, these are hyperperistalsis and prominent mucosal pattern with or without gastric retention. The presence of retained food or fluid within the stomach accompanied by some gastric dilatation is indicative of outlet obstruction of the stomach which, in the absence of an antral lesion, is statistically most likely to be due to a partially obstructing duodenal ulcer.

It is clear that evaluation of these so-called secondary signs of duodenal ulcer requires considerable judgment and experience and is fraught with pitfalls. It is the proper assessment of these signs, however, which must be sought in an effort to increase accuracy in the roentgenographic demonstration of this disease.

It is always unwise to make a definitive diagnosis on the basis of physical findings without obtaining a detailed history. Similarly, the radiologist should be fully informed of the patient's history prior to the roentgenographic examination. An adequate history should accompany the request for the examination, and the radiologist should interrogate the patient in an effort to obtain correlation of clinical evidence and roentgenographic findings which will lead to the highest degree of diagnostic accuracy.

There is a condition which is perhaps overdiagnosed and controversial, but has been definitely shown by Kirklin[12] to be a clinical and pathologic entity. We refer to duodenitis of the duo-

denal bulb. This requires special consideration. It is not possible to give an absolute roentgenographic diagnosis of duodenitis without perfectly typical findings correlated with typical symptoms and clinical findings. This is particularly true since normal variations in the mucosal pattern of the duodenal cap may in certain extreme instances simulate the pattern seen in duodenitis. These findings are usually described as a small bulb presenting a reticular pattern of the so-called cobblestone type. This pattern is not readily obliterated by pressure, as is usually the case in normal variation of mucosal pattern. These findings are associated with spasm of the duodenal bulb and a rapid passage of barium into the second portion of the duodenum. The return of the bulb mucosa to normal pattern after treatment confirms the original diagnosis, especially if correlated with improvement in symptoms (fig. 3).

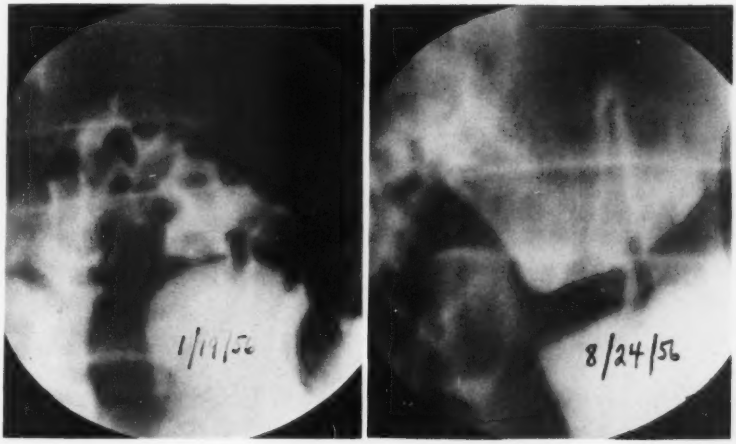

Figure 3. Duodenitis. Left: Contracted bulb with cobblestone mucosal pattern despite pressure over bulb. Bulb was spastic and tender at fluoroscopy. Right: Normal bulb shown after medical regimen, patient asymptomatic.

TECHNICS OF EXAMINATION

Technics for the performance of upper gastro-intestinal series are as many and varied as the number of examiners. It is the intention here only to emphasize certain maneuvers which may assist in the demonstration of duodenal ulcer, particularly in the more difficult cases.

Fluoroscopy. Primary emphasis should be placed upon careful fluoroscopy done by an examiner whose eyes have been well accommodated to darkness. Accommodation should be carried out for at least 20 minutes and preferably 30 minutes. It is important that fluoroscopic examination of the duodenal cap be carried out

in upright, supine, and prone projections as well as in various oblique positions. Palpation should be carried out in order to empty the bulb of excessive barium and to elicit possible tenderness. Bulb filling and emptying should be carefully observed.

Spot Films. Spot films of the duodenal cap should always be obtained; otherwise, a small percentage of duodenal ulcers will be missed. Films should, of course, be of the best technical quality possible and should be made with a pressure spot film device. Views in frontal and oblique projections should be obtained. In certain cases, particularly in examinations performed on hypersthenic individuals, demonstration of the duodenal bulb will be very difficult. Usually the visualization of the duodenal cap, which is obscured by the barium-filled antrum in frontal projections, can be obtained in oblique or true lateral projections. Pressure spot films of the duodenal cap should always be obtained when possible because a significant percentage of ulcers may be obscured by the barium-distended bulb lumen. This is particularly true in cases which show little bulb spasm. This compression will have the effect of displacing the barium from the bulb with the exception of that which is collected in the ulcer crater. Around the crater a radiolucent halo is frequently seen in the area of adjoining mucosal edema (fig. 4).

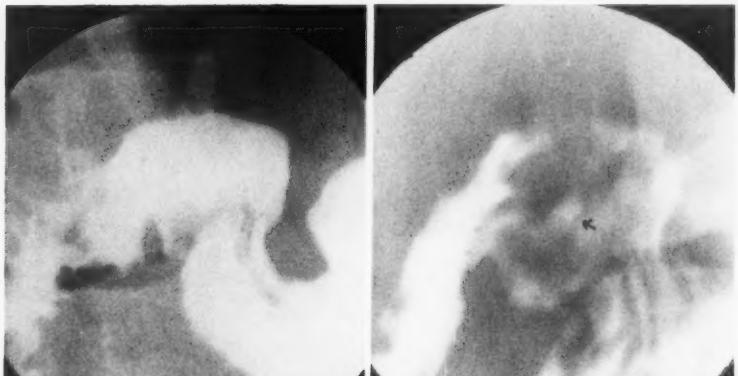

Figure 4. Central crater demonstrated by pressure spot film. Left: Usual oblique view appears normal. Right: Pressure spot film obtained at same examination clearly shows crater.

Spot Films With Patient in Prone Position. Under some circumstances, however, compression spot films may not be possible when the duodenal bulb is located under the right costal margin. This again is particularly true in hypersthenic individuals. In

such cases, prone spot films may be of definite value because the pressure of the table against the patient's abdomen may be sufficient to somewhat empty the duodenal bulb. Prone spot films may also be of considerable value when the duodenal bulb is so irritable or spastic that it will not remain filled in the upright position sufficiently long to obtain good spot films. The method will also overcome the problem of air trapped in the duodenal bulb, often encountered when the patient is examined upright. The prone method may also be expected to delineate a shallow anterior wall ulcer otherwise not demonstrable (fig. 5).

Figure 5. Apical crater demonstrated by spot film with patient in prone position. Left: Usual oblique view appears normal. Right: Oblique spot film, patient in prone position, right side dependent, clearly shows apical crater.

Air Contrast Spot Films. In hypersthenic individuals in whom palpation of the duodenal bulb is not possible, air contrast examination of the duodenal cap is frequently of value, particularly when a crater in the posterior wall is present. With the patient in the supine position and the right side slightly elevated, the gas bubble normally present in the stomach is displaced into the antrum. Within a short time some gas will pass through the pylorus into the duodenal cap, allowing visualization of the crater through the air-filled bulb as described by Hampton[13] and emphasized by Meyer[14] (fig. 6). If the gas bubble in the stomach is small or absent, a small quantity of carbonated material or Seidlitz powders can be given, as suggested by Hinkel and Moller.[15] In some instances of very shallow ulcers of the posterior wall this method is the only one by which the crater can be shown.

Demonstration of Bulb Through Air-Filled Antrum. When some patients are turned obliquely in either the upright or prone position, the duodenal bulb cannot be seen against the barium-filled body of

the stomach. Once again this is particularly true of hypersthenic individuals in whom the bulb cannot be seen in frontal projection either. In these individuals spot films of the duodenal bulb through

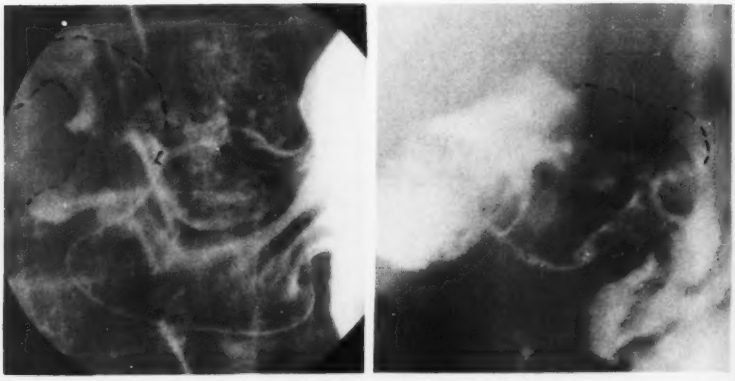

Figure 6. Crater demonstrated by air contrast bulb technic. Left: Crater is seen in profile. Right: Another niche is seen en face.

the air-filled antrum may be the only method allowing visualization of the cap (fig. 7). This may be easily carried out by using a small quantity of barium and carbonated beverage or Seidlitz powders.

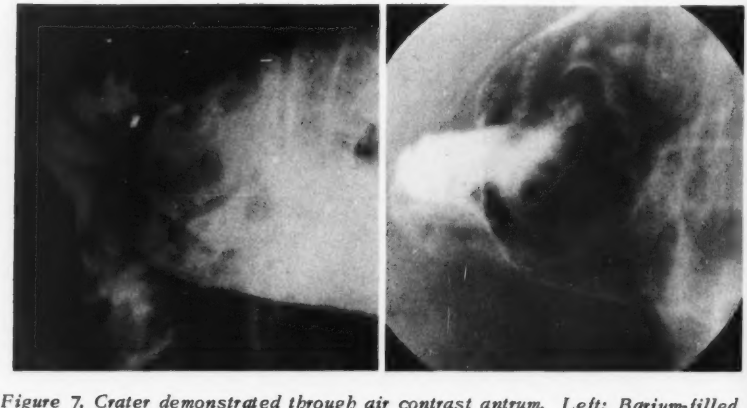

Figure 7. Crater demonstrated through air contrast antrum. Left: Barium-filled antrum obscures bulb. Note retained food particles. Bulb could not be seen in oblique or lateral projections whether patient was upright, prone, or supine. Right: Crater shown through air-filled antrum on repeat study done with Seidlitz powders. Crater confirmed at operation.

Other Views. In rare instances, certain other views may be of value in demonstrating the bulb that is difficult to visualize in the usual way. Among these are a lateral film made with the patient prone. This drops the stomach anteriorly away from the posteriorly

fixed duodenum. A decubitus film with the patient lying on the left side will allow displacement of the stomach to the left of the relatively fixed duodenum and may allow a clear demonstration of the cap.

HEALING OF DUODENAL ULCER

The problem of recognizing healing of a duodenal ulcer by roentgenography has been stated to be more difficult than the actual demonstration of the ulcer itself. Certainly a duodenal ulcer may be diagnosed as healed if the duodenal cap returns to an absolutely normal appearance (fig. 8). However, the presence of some residual

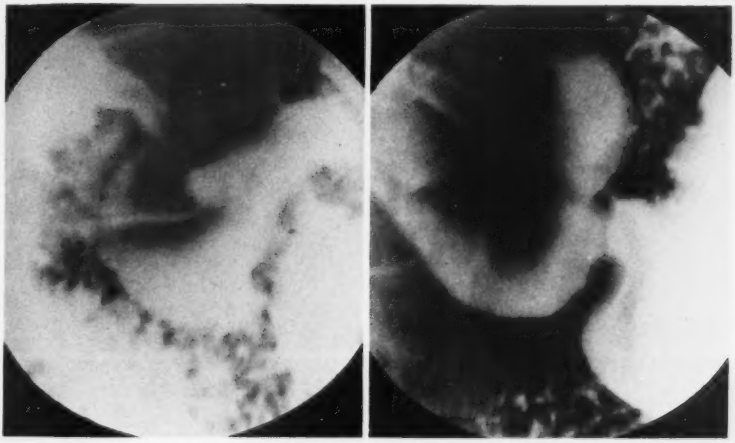

Figure 8. Healing of duodenal ulcer. Left: Pressure spot film shows crater. Right: Normal bulb after seven weeks of medical treatment.

deformity, even if a crater can no longer be shown, does not permit the diagnosis of healed duodenal ulcer. Small ulcerations may go undetected because of the deformity. The absence of irritability or spasm of the duodenal cap is of considerable importance, but these findings, particularly when minimal, are frequently difficult to assess. Diagnosis of healing based on the absence of these signs should be made with caution. In the presence of a deformed duodenal bulb, the most reliable criterion is the finding of persistent unchanged deformity despite the lack of prolonged observation. This should be correlated with the absence of clinical symptoms or signs.

Rarely, an apparent crater may persist indefinitely. In actuality, this is not a crater but a cicatricial pocket, healed but with enough depth to collect barium. Again, prolonged observation without evidence of change in asymptomatic individuals distinguishes this from an active ulcer (fig. 9). At times such a pocket may be

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so large that it simulates a duodenal diverticulum. Under many circumstances strong pressure may be brought to bear on the radiologist to state whether or not the ulcer is absolutely healed. Temptation to make a definite statement should be resisted until observation shows that no change in the deformity has taken place for several weeks or, preferably, months.

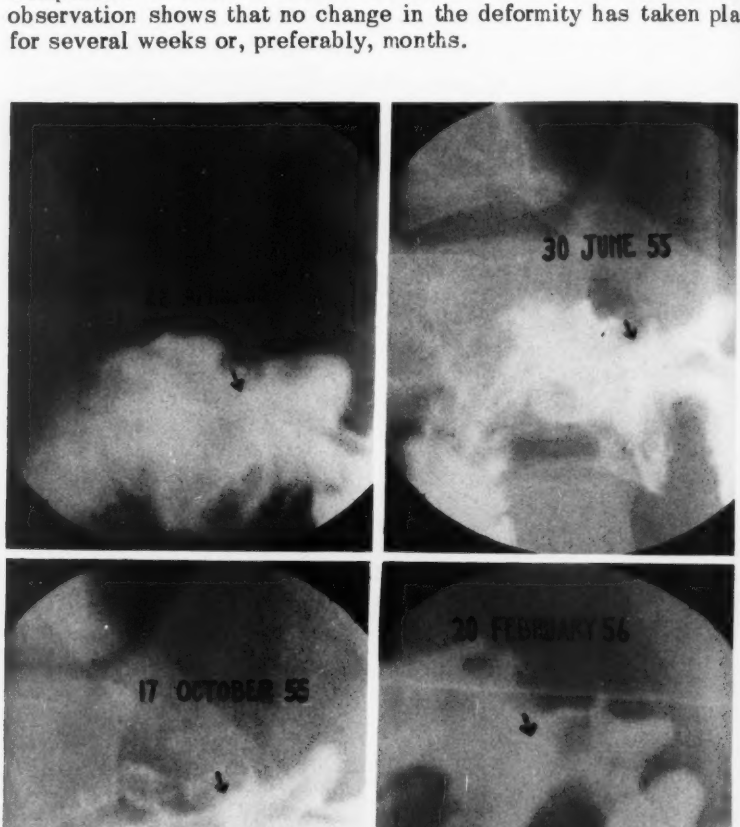

Figure 9. Healing of duodenal ulcer. Persistence of central accumulation of barium with Forssell's "mucosal corona," observed without change for 10 months in an asymptomatic patient. Accumulation of barium represents a healed cicatricial pocket with "puckered bulb."

SUMMARY

The incidence of duodenal ulcer is increasing, and its accurate diagnosis in members of the Armed Forces is of extreme importance. Careless or inexpert examinations are less than valueless; they can do much harm by resulting in erroneous opinions. Because of the heavy reliance placed on the roentgenographic diagnosis and follow-up of patients, the primary and secondary signs of duodenal ulcer have been reviewed and certain technical maneuvers for the resolution of more difficult cases have been reported and demonstrated.

REFERENCES

1. Hamilton, E. L.; Sullivan, B. H., Jr.; and Palmer, E. D.: Duodenal ulcer in military personnel; studies on military effectiveness of ulcer patients; magnitude of problem. *U. S. Armed Forces M. J.* 3: 831-838, June 1952.

2. Palmer, E. D., and Sullivan, B. H., Jr.: Duodenal ulcer in military personnel; studies on military effectiveness of ulcer patient; problem. *U. S. Armed Forces M. J.* 3: 455-459, Mar. 1952.

3. Palmer, E. D.; Sullivan, B. H., Jr.; and Hamilton, E. L.: Duodenal ulcer in military personnel; studies on military effectiveness of ulcer patient; review of 350 cases of recurrent duodenal ulcer. *U. S. Armed Forces M. J.* 3: 1123-1133, Aug. 1952.

4. Sherman, J. L., Jr.: Final common pathway in ulcer genesis. *U. S. Armed Forces M. J.* 7: 1001-1008, July 1956.

5. Hodges, F. J.: *The Gastro-Intestinal Tract: A Handbook of Roentgen Diagnosis.* Year Book Publishers, Inc., Chicago, Ill., 1944. p. 98.

6. Bockus, H. L.: *Gastro-enterology.* W. B. Saunders Co., Philadelphia, Pa., 1944. Vol. I, pp. 392-398.

7. Buckstein, J.: *The Digestive Tract in Roentgenology.* 2d edition. J. B. Lippincott Co., Philadelphia, Pa., 1953. pp. 250-274.

8. Golden, R. (editor): *Diagnostic Roentgenology.* Thomas Nelson & Sons, New York, N. Y., 1952. Vol. 1, pp. 340X-341D.

9. Ritvo, M., and Shauffer, I. A.: *Gastro-intestinal X-ray Diagnosis.* Lea & Febiger, Philadelphia, Pa., 1952.

10. Sandweiss, D. J. (editor): *Peptic Ulcer.* W. B. Saunders Co., Philadelphia, Pa., 1951. pp. 217-227.

11. Shanks, S. C., and Kerley, P. J. (editors): *Textbook of X-ray Diagnosis.* W. B. Saunders Co., Philadelphia, Pa., 1950. Vol. III, pp. 177-189.

12. Kirklin, B. R.: Roentgenologic consideration of duodenitis. *Radiology* 12: 377-381, May 1929.

13. Hampton, A. O.: Safe method for roentgen demonstration of bleeding duodenal ulcers. *Am. J. Roentgenol.* 38: 565-570, Oct. 1937.

14. Meyer, R. R.: Air contrast study of duodenal bulb; its importance in diagnosis of duodenal ulcer. *Radiology* 58: 393-399, Mar. 1952.

15. Hinkel, C. L., and Moller, G. A.: Routine barium gas examination of duodenal bulb. *Am. J. Roentgenol.* 75: 291-296, Feb. 1956.

INTRACARDIAC SURGERY USING AN ARTIFICIAL OXYGENATOR

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PROGRESS in intracardiac surgery has paralleled in a large measure the development of technics permitting repair of defects under direct vision. The first successful direct vision repair of an intracardiac defect was accomplished by Lewis and Taufic,[1] in 1952, utilizing hypothermia in combination with occlusion of cardiac inflow. Subsequently, hypothermia has been widely used and is a fairly adequate method in the repair of atrial septal defects. It is not satisfactory, however, in the repair of the more complicated congenital and acquired defects because of the time limitation imposed and the frequent occurrence of ventricular fibrillation.

Gibbon[2] successfully used an oxygenator of original design in repair of an atrial septal defect in 1953. Subsequently, Lillehei and associates[3] successfully utilized controlled cross circulation from a human donor in repair of a variety of intracardiac defects. In 1955, Lillehei and associates[4,5] developed a simple bubble oxygenator which was subsequently used successfully in over 150 cases. Simultaneously, Kirklin and coworkers[6] utilized the more complex Gibbon oxygenator for intracardiac surgery.

Lillehei and associates have demonstrated the efficacy of the oxygenator as an adjuvant in repair of ventricular septal defect, tetralogy and pentalogy of Fallot, atrioventricularis communis, atrial septal defect, total anomalous pulomonary venous return, congenital mitral stenosis, congenital and acquired aortic stenosis, and many other congenital and acquired defects. This oxygenator has been used successfully in infants weighing less than 5 kilograms and in adults of 80 kilograms for intracardiac procedures lasting up to 70 minutes.

At this hospital an oxygenator has been assembled as described by DeWall and associates[5] (fig. 1). It is simple in design, in-

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expensive, and all plastic parts are discarded after each case. Basically, it consists of a blood inlet tube, an oxygen inlet tube, a diffusion disk, a vertical oxygenating tube, a debubbling cham-

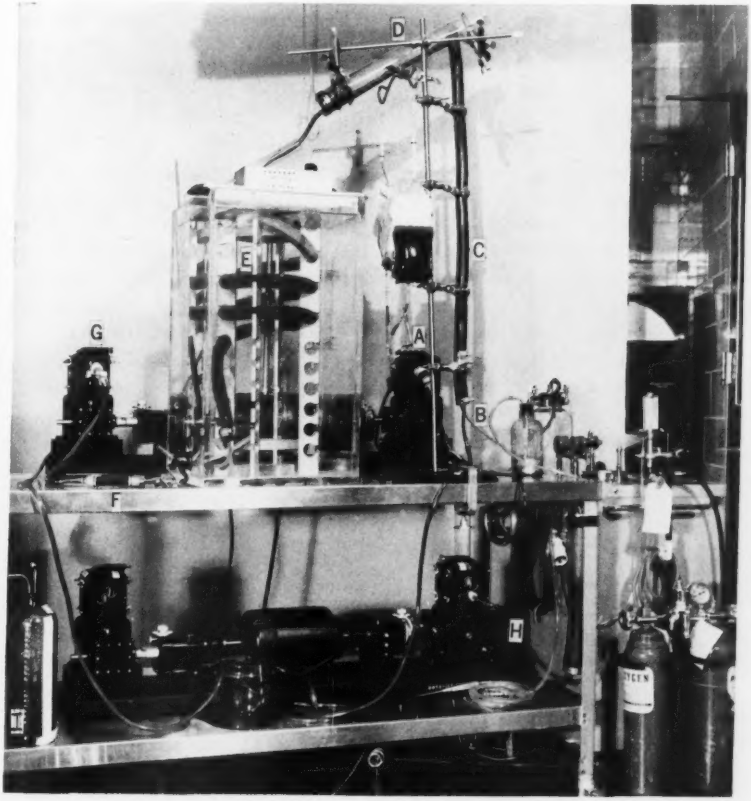

Figure 1. Pump oxygenator for cardiac bypass. (A) *Venous end of Sigmamotor pump receiving inflow from venae cavae and coronary sinus reservoir, pumping blood into oxygenating tube.* (B) *Oxygen inlet.* (C) *Oxygenating tube.* (D) *Debubbling chamber.* (E) *Helix reservoir in water bath.* (F) *Blood filter.* (G) *Arterial end of pump.* (H) *Reservoir and pump for return of blood from coronary sinus.* (I) *Reservoir for measuring blood loss via suction.*

ber, and a helix reservoir for additional debubbling. The debubbling chamber is thinly coated with Antifoam A. Blood is withdrawn from the patient through catheters in the superior and inferior venae cavae and returned to the patient via a catheter placed in the lumen of the aorta through the subclavian artery. A Sigmamotor pump is utilized in the circuit.

The following is a report of the first three cases of intracardiac surgery performed with the aid of an artifical oxygenator at this hospital.

CASE REPORTS

Case 1. A 27-month-old boy had suffered some decreased exercise tolerance accompanied by frequent upper respiratory infections, cyanosis, and syncope, since birth. His condition had become progressively worse prior to his final admission on 25 July 1956. On 8 February 1956, cardiac catheterization (table 1) was performed, followed by angiocardiography. Catheterization revealed a left to right shunt at the artrial level, pulomonic stenosis, and a persistent left superior vena cava. Angiocardiograms suggested the presence of an intraventricular septal defect in addition to the other anomalies. Physical examination revealed a poorly developed, cyanotic child.

TABLE 1. *Cardiac catheterization data for case 1*

	Oxygen saturation (per cent)	Pressure (mm Hg)
Superior vena cava (left)		
High	70	-
Low	87	
Superior vena cava (right)	60	-
Inferior vena cava	71	-
Right atrium	81	16/6
Right ventricle	82	100/0
Pulmonary artery	81	24/10
Femoral artery	62	105/68

The blood pressure was 105/68 mm Hg and the erythrocyte count was 6,000,000/μl. There was a loud, harsh, systolic murmur audible over the entire precordium, loudest in the second and third intercostal space to the left of the sternum. A systolic thrill was also palpable in this region. Roentgenograms revealed right ventricular and left atrial enlargement with a decrease in the pulmonary vascular markings. On 27 July an operation was performed via a transverse bilateral anterior thoracic incision. It was noted that the left superior vena cava entered the left atrium. This vessel was then ligated. Total cardiac bypass was accomplished with perfusion by means of the pump oxygenator. A right ventriculotomy was performed and a 1- by 1½-cm intraventricular septal defect was repaired with the aid of a patch of Ivalon (brand of polyvinyl) sponge. The defect was located high in the right ventricle. A pulmonary valvotomy was performed relieving the pulmonic stenosis. Through an atrial incision a 2- by 2½-cm atrial septal defect was repaired by direct suture. Total

cardiac bypass lasted 31 minutes. Postoperatively, the patient did moderately well; however, complete heart block which had ensued following closure of the atrial septal defect persisted. Thirty-six hours postoperatively respiratory difficulty and cyanosis appeared. A tracheostomy was performed with some temporary improvement, but 12 hours later cyanosis and circulatory failure recurred, followed by death.

Comments. Autospy revealed complete repair of the defects. Death can be attributed to cardiac failure subsequent to repair of multiple defects and persistence of complete heart block.[7]

Case 2. A six-year-old girl had a heart murmur since infancy, retardation of growth, frequent respiratory infections, and exercise intolerance. Cyanosis of the lips had been noted on occasion. Physical examination revealed a loud systolic murmur over the precordium, most prominent in the fourth intercostal space to the left of the sternum, accompanied by a marked thrill. The blood pressure was 100/60 mm Hg, and the second pulmonic sound was somewhat prominent. Roentgenograms revealed an enlarged right ventricle with evidence of increased pulmonary blood flow. Cardiac catheterization (table 2) on 22 October 1955 revealed a left to right shunt at the ventricular level and a 40-mm pressure gradient across the pulmonic valve. Systemic arterial

TABLE 2. *Cardiac catheterization data for case 2*

	Oxygen saturation (per cent)	Pressure (mm Hg)
Superior vena cava	58	-
Inferior vena cava	68	-
Right atrium	55	20/5
Right ventricle	77	100/0
Pulmonary artery	77	60/18
Left pulmonary artery	-	44/16
Femoral artery	86	100/60

oxygen saturation was 86 per cent. These findings were interpreted as consistent with the tetralogy of Fallot accompanied by a bidirectional shunt. On 14 August 1956, a right ventriculotomy was performed and a high 1.5- by 1-cm ventricular septal defect with firm fibrous edges was closed with a series of interrupted silk sutures. Pulmonary infundibular stenosis was present and relieved by excision of the obstructing tissue. Postoperatively the patient did well until the evening of surgery at which time repeat thoracotomy was necessitated by a bleeding from a small coronary artery. Subsequently the patient had an uneventful postoperative course and was discharged on the 21st postoperative day. At the time of discharge there was no thrill and only

a Grade I systolic murmur was audible over the pulmonic area. The patient is doing well five months after operation.

Comments. "Overriding of the aorta," a classical concomitant of the tetralogy of Fallot is more a functional than anatomic factor. Repair of the ventricular septal defect in these cases presents little more difficulty than encountered in repair of ventricular septal defect unaccompanied by pulmonary obstruction.

Case 3. A two and one-half year-old Hawaiian boy was admitted to this hospital on 29 August 1956. He had had six previous hospitalizations for bronchopneumonia and cardiac failure. A cardiac murmur had been detected shortly after birth and he had received digitalis since the age of six months. Development had been normal; weight gain was poor. In the interim between hospital stays he manifested moderate exercise intolerance. Physical examination revealed a bulging precordium with a harsh systolic murmur and thrill, most prominent in the fourth intercostal space to the left of the sternum. The second pulmonic sound was markedly accentuated. Roentgenograms showed right ventricular hypertrophy and some left atrial enlargement. Electrocardiogram was characteristic of right ventricular hypertrophy. Cardiac catheterization data is shown in table 3. On 6 September, using the artifical oxygenator, a large 2.5-cm ventricular septal defect

TABLE 3. *Cardiac catheterization data for case 3*

	Oxygen saturation (per cent)	Pressure (mm Hg)
Superior vena cava	64	
Inferior vena cava	67	
Right atrium	60	
Right ventricle	72	94/0
Pulmonary artery	72	75/37
Femoral artery	98	121/82

was repaired through a ventriculotomy incision. The defect was located posteriorly and high in the septum, the tricuspid annulus comprising the right margin of the defect. A pledget of polyvinyl sponge was used to buttress the closure. Cardiac bypass lasted 42 minutes. Postoperatively the patient had an uneventful course. A soft, systolic pulmonic murmur persists. The thrill has disappeared. A roentgenogram of the chest revealed decreased engorgement of the pulmonary vessels.

Comments. To date (five months postoperative), this child has done well. Both patients (cases 2 and 3) have had no respiratory infections postoperatively. The mothers have been amazed by the marked increase in the activity of these two children.

SUMMARY

An artificial bubble oxygenator has been used in the repair of a congenital cardiac defect in three children. Successful repair was accomplished in one child with a ventricular septal defect, and in a second with the tetralogy of Fallot. A third patient with the pentalogy of Fallot and a left superior vena cava draining into the left atrium, succumbed from the combined effects of complete heart block and congestive heart failure.

REFERENCES

1. Lewis, F. J., and Taufic, M: Closure of atrial septal defects with aid of hypothermia; experimental accomplishments and report of one successful case. *Surgery* 33: 52-59, Jan. 1953.

2. Gibbon, J. H., Jr.: Application of mechanical heart and lung apparatus to cardiac surgery. *Minnesota Med.* 37: 171-180; 185, Mar. 1954.

3. Lillehei, C. W.; Cohen, M.; Warden, H. E.; and Varco, R. L.: Direct-vision intracardiac correction of congenital anomalies by controlled cross circulation; results in 32 patients with ventricular septal defects, tetralogy of Fallot, and atrioventricularis communis defects. *Surgery* 38: 11-29 July 1955.

4. Lillehei, C. W.; DeWall, R. A.; Read, R. C.; Warden, H. E.; and Varco, R. L.: Direct vision intracardiac surgery in man using simple, disposable artificial oxygenator. *Dis. Chest* 29: 1-8, Jan. 1956.

5. DeWall, R. A.; Warden, H. E.; Read, R. C.; Gott, V. L.; Ziegler, N. R.; Varco, R. L.; Lillehei, C. W.: Simple expendable artifical oxygenator for open heart surgery. *S. Clin. North America* 36: 1025-1034, Aug. 1956.

6. Kirklin, J. W.; Dushane, J. W.; Patrick, R. T.; Donald, D. E.; Hetzel, P. S.; Harshbarger, H. G.; and Wood, E. H.: Intracardiac surgery with aid of mechanical pump-oxygenator system (Gibbon type); Report of 8 cases. *Proc. Staff Meet. Mayo Clin.* 30: 201-206, May 18, 1955.

7. Rivkin, L. M.; Varco, R. L.; Winchell, P. W.; and Lillehei, C. W.: Management of surgically produced complete heart block; clinical and experimental data. To be published in *J. Thoracic Surg.*

FACT AND FANCY

"It is not easy for the student or physician to move through a busy career and maintain a lively curiosity. Too often we encounter satisfaction and even complacency in the statement, 'We must not go beyond the facts.' I belong to a school which holds that we must encourage our pupils to let fancy roam where it will. The danger-line between fact and fancy will never be obscured when fancy is habitually encouraged to formulate tests whereby its truth may be examined."

—ASHLEY WEECH, M. D.
in *Journal of Medical Education*
p. 106, Feb. 1956

MITRAL COMMISSUROTOMY AT AN ARMY HOSPITAL

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MANY people have contributed to the development of mitral commissurotomy as a standard operation for mitral stenosis. To mention a few, Souttar[1] in 1925 used a technic similar to that employed today and had a successful result in one case. His colleagues were so unimpressed, or alarmed, that no more cases were referred. In the third decade of this century, the 80 per cent mortality in 10 operated cases justified a gloomy outlook for surgical treatment.

Bailey[2] inaugurated the modern era by performing an unsuccessful finger fracture of the mitral valve in 1946. He, as well as Harken and associates,[3] performed successful valvulotomies with instrumental aid in 1948. Following these pioneer efforts, progress was rapid, and at the present time there are many 3- to 5-year follow-up reports in the literature.[4–9]

Most articles report an operative mortality varying from 2 per cent[10] to 20 per cent[3] in Class IV cases. Kuzman and associates[4] reported an over-all mortality of 9 per cent in 67 cases, with the rate varying from 0 per cent in Class II to 30 per cent in Class IV. Mortality was high if associated aortic valve lesions were present. Eighty-four per cent of the patients had an excellent to good result on 1- to 2-year follow-up. From 1,000 cases followed up to 7 years, Bailey and Bolton[5] found that (1) nearly 90 per cent of the survivors were improved, (2) the early mortality rate was 8 per cent, (3) late deaths accounted for 5.6 per cent, and (4) that mild postoperative mitral insufficiency was of no significance, but that marked insufficiency was very serious. They also observed that recurrences do happen.

Swann and associates,[7] believed that the degree of calcification of the valve determined the postoperative result, while Baker, Brock, and Campbell[8] showed that, irrespective of calcification, the result correlated with what the surgeon believed he accomplished—the larger the postoperative orifice without regurgitation, the better the result. These authors also showed

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that (1) the percentage of patients in the excellent category declined slightly year by year; (2) restenosis can occur with further rheumatic activity; and (3) that pulmonary hypertension, when checked by cardiac catheterization a year or two after commissurotomy, reverts to normal in cases having an excellent result.

Glover, O'Neill, and Janton[9] showed that only 8 per cent of 50 patients on 5-year follow-up had no murmurs, 19.5 per cent had postoperative evidence of rheumatic activity, and 24 per cent had smaller cardiac silhouettes.

PRESENT STUDY

This analysis includes 33 consecutive cases in which operation was performed from October 1953 to January 1955. In one of the cases, reoperation was necessary. The patients were placed in four categories closely corresponding to those used by the American Heart Association (table 1).

TABLE 1. *Clinical classification of patients with mitral stenosis*

Class	Number of patients
I. Physical signs of mitral stenosis are present, but the patient is asymptomatic.	4
II. The patient is symptomatic, but there are only minor limitations of activity and the process is not showing progression.	13
III. Symptoms are progressive; there is moderate to marked limitation of activity; the patient may exhibit auricular fibrillation, hemoptysis, acute pulmonary edema, and has only a limited response to cardiac drugs and bed rest.	14
IV. The patient is bedridden with chronic heart failure.	2
Total	33

Only 1 of our patients was on active duty, 1 was retired, 1 was a Red Cross worker, and 30 were civilian dependents. This is readily explained since rheumatic disease is a cause of rejection for military service.

The distribution according to age noted in table 2 corresponds with that generally found. This indicates that mitral stenosis most often causes the patient to seek aid between 20 and 40 years of age. Three of the six deaths occurred in patients of ages between 47 and 59 years.

TABLE 2. *Age distribution of patients*

Age (years)	Number of patients
Less than 20	2
20 to 30	12
30 to 40	12
40 to 50	6
50 plus	1
Total	33

As table 3 indicates, mitral stenosis without insufficiency was the lesion most commonly found. Insufficiency of varying degree was found in a significant number of cases, this sometimes having been diagnosed prior to operation. Commissurotomy in the presence of slight insufficiency was found to be indicated, since the procedure seldom increased and occasionally decreased the amount of regurgitation. However, as will be discussed, the postcommissurotomy regurgitation syndrome is a real entity and one to be feared.

TABLE 3. *Lesions encountered at operation*

Lesion	Number
Mitral stenosis	25
Mitral stenosis with insufficiency	7
Multivalvular	2
Other (pneumonia)	1

The early mortality rate in this series was 12 per cent; total, 18 per cent. Operative complications were far from unusual and included 3 auricular tears, 2 ventricular fibrillations, 1 cardiac standstill, 1 ventricular tear, 1 cerebral embolus, 1 marked regurgitation after commissurotomy requiring attempt at operative

correction, 1 inadequate commissurotomy due to a small auricular appendage, and the incidental finding of an early virus pneumonia with serofibrinous pleurisy. Postoperative complications included 4 cases of persistent auricular fibrillation; 2 cases each of thrombophlebitis, hydrothorax, and pericardial effusion; 1 atelectasis; and 1 bacterial endocarditis and septicemia caused by *Micrococcus pyogenes* var. *albus*.

Poor results (table 4) included one unsuccessful operation due to a small auricular appendage. This patient was reoperated on under hypothermia with a bilateral approach and his status changed from Class III to Class I. The other poor results were due to postcommissurotomy mitral regurgitation in three patients.

TABLE 4. *Operative results*

Commissurotomy method	Total number of operations	Results			
		Improved	Unimproved or worsened	Died	
				Early	Late
Finger fracture	33	23	4	4	2
Use of valvulotome	1	1			
Total	34*	24	4	4	2

*Two of these operations were on the same patient.

Operative deaths included a Class IV, 59-year-old man with trivalvular disease and extensive arteriosclerosis who was accepted for commissurotomy knowing he was a very poor risk. A 47-year-old, female, Class II patient, considered to be an excellent operative risk, developed ventricular fibrillation, during surgical intervention, that converted only after a prolonged period. She never regained consciousness and died of bronchopneumonia during the early postoperative period. Cerebral embolism prior to opening the auricle caused death in a 47-year-old, Class II patient who had fibrillation. It is interesting to note that 3 of the 4 deaths occurred in our 7 patients over 40 years of age.

The fourth death occurred in a 29-year-old, Class II patient who at thoracotomy was found to have an early virus pneumonia. The lungs were heavy and serofibrinous pleurisy was present. The patient developed marked regurgitation after commissurotomy. This was repaired by placing a transventricular suture in the posterior commissure. In addition, temporary cardiac standstill occurred when the pericardium was closed. This unfortunate patient died of bronchopneumonia on the fourth postoperative day.

Late deaths included that of a 35-year-old, Class IV patient with a diagnosis of mitral stenosis and insufficiency and aortic insufficiency. She developed or had a reactivated bacterial endocarditis and septicemia caused by *M. pyogenes* var. *albus* and died two and one-half months after surgical intervention.

The other late death occurred in a 24-year-old, Class I patient who was operated on because pulmonary hypertension had been demonstrated. The preoperative diagnosis was mitral stenosis and insufficiency. The operation was uneventful. A stenotic orifice was adequately fractured without creating significant insufficiency. During her convalescence auscultation revealed a marked decrease in the diastolic murmur. She gradually developed cardiac decompensation and died elsewhere 17 months after commissurotomy. Autopsy revealed a severe mitral stenosis. One can only conclude that the leaflets reapposed.

Examination three to six months after surgical intervention generally reveals the usual physical signs of mitral stenosis. Two patients revealed normal physical findings, and these patients, one over 40 years of age, have had excellent results. As has been mentioned before, the murmur of mitral insufficiency is frequently heard postoperatively. This is associated with a poor result only if the degree of insufficiency is severe.

CONCLUSIONS

The surgical relief of mitral stenosis is not without hazard, inasmuch as it carries a significant operative mortality and may actually result in symptomatic worsening of the patient. However, in the properly selected patient, improvement after surgical intervention is the usual outcome and results may be dramatic. This study suggests that patients over 45 years of age should be selected for commissurotomy with great care. Operation on Class IV patients and those with multivalvular disease has a greatly increased risk. Class I patients should not be operated on but should be followed and surgical intervention recommended at such time as progression becomes apparent.

While mitral commissurotomy is one of the simpler cardiac operations, it is not one to be recommended casually. It carries a significant operative and late operative mortality, and may be followed by a progression of symptoms. The value derived justifies the risks involved in the properly selected case.

REFERENCES

1. Souttar, H. S.: Surgical treatment of mitral stenosis. *Brit. M. J.* 2: 603-606, Oct. 3, 1925.

2. Bailey, C. P.: Surgical treatment of mitral stenosis (mitral commissurotomy). *Dis. Chest* 15: 377-397, Apr. 1949.

3. Harken, D. E.; Ellis, L. B.; Ware, P. F.; and Norman, L. R.: Surgical treatment of mitral stenosis; valvuloplasty. *New England J. Med.* 239: 801-809, Nov. 25, 1948.

4. Kuzman, W. J.; Griffith, G. C.; Jones, J. C.; and Meyer, B. W.: Mitral stenosis; clinical diagnosis; treatment, and follow-up of a select group. *A. M. A. Arch. Int. Med.* 97: 466-482, Apr. 1956.

5. Bailey, C. P., and Bolton, H. E.: Criteria for and results of surgery for mitral stenosis; results of mitral commissurotomy. *New York J. Med.* 56: 825-839, Mar. 1956.

6. Cohen, M.: Mitral valvulotomy; results of a preliminary survey in 104 consecutive cases. *Canad. M. A. J.* 74: 788-792, May 1956.

7. Swann, W. K.; Bradsher, J. T. Jr.; Lomasney, T. L.; and Rodriguez, J. A.: Results of surgery for mitral stenosis. *Am. Surgeon* 21: 996-1000, Oct. 1955.

8. Baker, C.; Brock, R.; and Campbell, M.: Mitral valvotomy; Follow-up of 45 patients for 3 years and over. *Brit. M. J.* No. 4946: 983-991, Oct. 22, 1955.

9. Glover, R. P.; O'Neill, T. J.; and Janton, O. H.: Analysis of 50 patients treated by mitral commissurotomy 5 or more years ago. *J. Thoracic Surg.* 30: 436-451, Oct. 1955.

10. French, S. W., and Hewlett, T. H.: Mitral commissurotomy. *U. S. Armed Forces M. J.* 6: 193-203, Feb. 1955.

BLOOD GROUPS AND GASTRIC CANCER

"In 119 cases of carcinoma of the stomach the excess of blood-group A over blood-group O was due to an association between group A and carcinoma of the pyloric end of the stomach.

"There was no excess of group A in carcinoma arising in the body of the stomach, and hence this material provides no support for the hypothesis that group A is associated with atrophy of the acid-producing mucosa and achlorhydria.

"The antral mucosa of persons with blood of group A is apparently more liable to inflammation and carcinoma than that of group-O persons."

—D. JENNINGS, B. M.; R. H. BALME, B. M.; and J. E. RICHARDSON, M. S.
in *Lancet*
p. 12, 7 July 1956

EVALUATION OF PANCREATIC EXOCRINE FUNCTION AND INTESTINAL ABSORPTION WITH RADIOACTIVE FAT

Preliminary Report

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LIPASE, a pancreatic enzyme, converts fats to fatty acids and gylcerin, which are then absorbed from the alimentary canal. When the enzyme is present in sufficient quantity and intestinal absorption is normal, the healthy adult will take up almost 100 per cent of orally administered radioactive fat (olein [triolein] labeled with iodine 131). Failure to absorb the entire dose results in the appearance of abnormal quantities of iodine 131 (I^{131})-tagged fat in the stool. Such a finding indicates that either (1) the production or delivery of pancreatic lipase to the gut is deficient, or (2) the absorptive apparatus is at fault. The technic used in this study is less complicated than previous procedures[1] for the evaluation of pancreatic and intestinal function with radioactive fat.

METHOD

Olein-I^{131} is added to a small quantity of a carrier (composed of 200 ml of peanut oil, 200 ml of water, and 15 ml of Tween-80), and is stored for future use. When a dose is to be made, an aliquot containing 25 microcuries of radioiodine is drawn off and diluted with carrier so that the final volume taken by the patient is 1 ml per kilogram of body weight. Another sample is made up in identical fashion, to be used as the standard. Traces of radioactive fat cling to the cup from which the patient drinks the olein-I^{131}. Hence this cup is saved so that its radioactivity can be determined and subtracted from the standard in calculating the dose ingested, as discussed below.

The patient drinks a suspension of 10 drops of Lugol's solution and a suitable indicator (such as carmine dye or charcoal) in

From Radioisotope Laboratory, U. S. Naval Hospital, Bethesda, Md.

60 ml of water. The Lugol's solution presents the body with a large dose of iodine and prevents significant uptake of radioiodine by the thyroid gland. The indicator is used to mark the complete passage of the material through the digestive tract, and obviates the use of roentgenograms with barium swallow. Immediately after this medication, the patient drinks the olein-I^{131} and carrier mixture.

All stools are saved after the fatty mixture is ingested until traces of the charcoal or carmine marker no longer appear. It would be less accurate to specify an arbitrary number of days required for stool collection. Probably as a result of patients' inactivity in the hospital several days may pass before all the radioactive material has been excreted by some patients. Specimens are collected in 1-quart, leak-proof containers and are kept cool or refrigerated to reduce odor and bacterial activity. The standard is also refrigerated to prevent deterioration of the fat. It is of the utmost importance that no urine contaminates the stool; this caution must be repeatedly emphasized to the patients, and also the nursing staff if the procedure is performed in the hospital.

To maintain approximately constant volume, the standard and the cup from which olein-I^{131} was drunk are placed in separate, 1-quart containers, water is added to the top, and the containers are shaken thoroughly after the covers are replaced. Water is also added to the 1-quart container holding the stool sample, and it is also shaken. A scintillation counter (sodium iodide, thallium-activated) is used for the radioassays. The container is placed 20 cm from the detection probe; at this distance, the solid angle viewed by the probe includes the entire container. Counts of background, standard, cup, and stool are taken for 3 minutes. The standard registers approximately 25,000 counts during the 3-minute interval, which is well above the background count.

The per cent of the administered dose of olein-I^{131} which appears in the stool, may be calculated as follows:

$$\frac{\text{(counts in stool - background) x 100}}{\text{(counts in standard - background) - (counts in cup - background)}}$$

or, more simply by:

$$\frac{\text{(counts in stool - background) x 100}}{\text{(counts in standard - counts in cup)}}$$

The individuals undergoing this study were from the medical services of this hospital. Two groups took the test, those with gastro-intestinal disorders and patients with other diseases but without known active alimentary dysfunction.

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RESULTS

Typical results obtained are presented in table 1. The patients in this table were the first 10 individuals on whom the test was performed. Our total series at present includes nearly 30 cases. Although this total number of cases are not fully evaluated, the average excretion in this group, both normal and abnormal, appears to be *identical* with that of the 10 patients in this preliminary report. Fecal excretion of olein-I^{131} (or its metabolites) by the "normal" subjects averaged 1.8 per cent (±0.8) of the ingested dose (±0.8 is two standard deviations). Elevated excretion of olein-I^{131} was found to range from 4 per cent (in a male who had a subtotal gastrectomy) to over 50 per cent (in a patient with biliary obstruction due to metastatic carcinoma).

TABLE 1. *Stool excretion of olein-I^{131} in adult patients*

Sex	Age (years)	Diagnosis	Excretion in per cent of administered dose
		Normal Excretion	
M	24	Nematode infestation	1.7
F	51	Brucellosis	2.0
M	34	Diabetes mellitus	1.3
M	63	Carcinoma of abdomen, ? primary	2.3
M	25	Inactive peptic ulcer (duodenal)	1.5
		Elevated Excretion	
M	30	Subtotal gastrectomy	4.0
F	68	Sprue, in remission	5.9
M	37	Alcoholism, chronic pancreatitis	10.4
M	33	Alcoholism, active duodenal ulcer, ? pancreatitis	10.6
M	55	Ampulla of Vater, obstruction of, and jaundice due to metastatic carcinoma of colon	50.1

DISCUSSION

The technic merits further investigation, because it offers a means of studying pancreatic function and intestinal absorption, two systems that are notoriously difficult to evaluate. The test is economical, for the total cost of the olein-I^{131} and carrier is less than a dollar per patient. It can be performed by any laboratory that is equipped to do 24-hour thyroid I^{131} uptake studies. Furthermore, there is no trauma to the patient. The procedure

may be done on an outpatient basis, or can be performed while the individual is in the hospital undergoing other diagnostic tests, provided they do not interfere with digestive function or stool collection. The present technic is simplified over previous methods in three respects:

1. A readily detectable dye, such as charcoal or carmine, is used to mark the passage of the ingested material through the digestive tract. Hence, barium swallow and fluoroscopy are not necessary to indicate when the material has been passed. Use of a dye enables the procedure to be done on an outpatient basis.

2. Determination of I^{131} blood levels are not required. There is no specific indication, therefore, for hospitalizing the patient.

3. The use of one solution as the carrier facilitates handling by the physician or his technicians.

Either a deficit of pancreatic lipase or a decreased absorption of lipids will result in the appearance of fat tagged with radioiodine in the stool. If pancreatic function were normal, then the olein would be split to fatty acids and glycerin, even though absorption were at fault. Hence, a further refinement of the technic would be to fractionate the stool specimen,[2] to observe if the radioactivity is present as olein-I^{131} or its digestion product, oleic acid-I^{131}.

The detection of greater than normal quantities of radioiodine fat in the stool of a postgastrectomy patient has also been noted by Sanders and his co-workers.[1] This may partially account for the nutritional disturbance seen in those who have had their stomach removed, and suggests the possibility that the gastric mucosa produces a substance necessary for the absorption of fat by the intestines.

SUMMARY

A simplified test using fat tagged with radioiodine in the evaluation of a deficiency of pancreatic exocrine function, or errors in alimentary absorption, is described. The test is easily performed and inexpensive.

Patients with disorders that decrease the amount of pancreatic enzymes reaching the gut (chronic pancreatitis, obstruction of the Ampulla of Vater), and those with decreased intestinal absorption of fats (such as sprue), excrete more of an ingested dose of olein (triolein)-I^{131} in their stool than do adults without active gastro-intestinal disease.

Increased stool olein-I^{131} excretion was also observed in a postgastrectomy patient, and a possible role of the stomach in fat absorption by the gut is discussed.

REFERENCES

1. Sanders, A. P.; Isley, J. K.; Sharpe, K.; Baylin, G. J.; Shingleton, W. W.; Hymans, J. C.; Ruffin, J. M.; Reeves, R. J.: Radioiodine recovery in feces following an I^{131} labeled fat test meal. *Am. J. Roentgenol.* 75: 386-389, Feb. 1956.

2. Savary, P., and Desnuelle, P.: Etude chromatographique de l'action de la lipase pancreatique sur des triglycerides mixtes. (Chromatographic study of action of pancreatic lipase on triglyceride mixtures.) *Compt. Rend. Acad. d. sc.* 240: 2571-2573, June 27, 1955.

PLASMA AMYLASE IN RENAL INSUFFICIENCY

"Plasma amylase concentration may be markedly elevated in some cases of acute renal insufficiency without implying an associated acute pancreatitis. Although trauma, opiates and, possibly, chemical derangements may enhance amylase concentration by increased production, the diminished urinary excretion appears to be the major cause of the protracted and exaggerated levels. When chemical and clinical uremia was modified by artifical-kidney dialysis the plasma amylase was not consistently affected and fluctuated at high levels. The urine-plasma amylase was found to vary greatly and was not therefore of diagnostic import."

—WILLIAM H. MERONEY, M. D.;
NATALIE L. LAWSON, M. S.;
MILTON E. RUBINE, M. D.;
and JOHN V. CARBONE, M. D.
in *New England Journal of Medicine*
p. 320, Aug. 16, 1956

PRACTICAL ALLERGY PROGRAM FOR SMALL MILITARY INSTALLATIONS

MERLE S. SCHERR, *Captain, MC, USA*

FACILITIES for the care of allergic patients in military installations usually have been limited to the larger hospitals, although some small hospitals have had basic facilities for medical officers who were interested in the specialty. The need for a practical allergy program for the smaller hospitals and clinics has long been recognized. This article outlines a basic program for military physicians to use in treating allergic patients in units where a qualified allergist is not available. A complete allergy program has been described in a technical bulletin.[1]

The majority of patients treated without referral to a large hospital will be those with seasonal and perennial allergic rhinitis, mild bronchial asthma, and related disorders. Because these patients do not need to be hospitalized, a practical plan for treating them in the small clinic or hospital will save time, transportation, and money, and will permit them to begin and continue treatment under the care of the same medical officer.

CONTROL OF DUST AND DIET

This article deals primarily with the requirements for basic skin testing and treatment, and if proper dust precautions and dietary studies are used, a large amount of testing of the average patient will be unnecessary. The physician should instruct the patient in procedures designed to free his environment of the common inhalants and allergens such as feathers, house dust, animal danders, and fly spray. Suggested directions for the preparation and maintenance of a dust-free room, which should be followed to the fullest extent that conditions permit, are as follows:

For best results, the home and environment of dust-sensitive persons must be maintained as free from dust as possible. In at least one room all sources of dust should be eliminated. The bedroom is usually the most suitable for this purpose.

From Fitzsimons Army Hospital Denver, Colo. Dr. Scherr is now at 803 Atlas Building, Charleston, W. Va.

All rugs, curtains, and drapes should be removed. The room should contain only one bed, preferably an iron one. If a second bed is necessary it also must be prepared as described. Wash the bed, springs, and slats thoroughly. Cover the pillows, mattress, and springs (if box type used) with allergen-proof encasings. The encasings must be sealed or sewed on, to ensure airtightness. The bed should be made up frequently with fresh plain linen. No mattress pad should be used. Coverings should be plain and washable; stuffed comforts or quilts are not permissible.

The walls, floors, picture molding, baseboards, and furniture should be washed and the woodwork preferably waxed. Furniture, including chairs, should be wooden and easily washable. Upholstered or cloth-covered chairs are not permissible.

All bookcases, pictures, or wall plaques should be removed and all cracks and holes sealed. Furnace pipes leading into the room should be sealed. If hot-air heat must be used, outlets should be covered with cheesecloth or, preferably, the system air-conditioned and filtered. Radiators should be scrubbed.

The room should be cleaned daily and thoroughly cleaned once a week. Closets should be cleaned the same as the room, and clothing kept elsewhere. Avoid moth-proofing and deodorants, as the ingredients are possible allergens.

If the patient is a child, do not keep toys in the room, except for washable toys that will not accumulate dust. No stuffed toys are allowed.

Dressing and undressing should be done outside this room, which should be used for resting and sleeping only. Avoid irritating odors such as gas, paint, and smoke. Do not allow pets in the house without specific permission.

The above instructions should apply to the entire house of a dust-sensitive patient, but practicability must be considered. However, the one room should be properly prepared and maintained and the rest of the house kept as free from dust as possible. Where occupational dust conditions cannot be controlled and a change of occupation is not feasible, a dust respirator should be used.

The physician should also be familiar with dietetic procedures, because proper elimination diets and food diary studies, such as are described in the *Standard Army Diet Manual,* will be of great diagnostic aid and usually will make it unnecessary for the patient to be subjected to skin tests for food allergens. If a complete survey is needed, it should be performed at the nearest general hospital having a qualified allergist and allergy clinic.

EQUIPMENT AND SUPPLIES

Basic equipment items such as 1-ml tuberculin syringes, one-half inch No. 27 hypodermic needles, alcohol sponges, and tourniquets are available at all military medical installations. The only preparations necessary in addition to 70 per cent alcohol, diluting fluid, and 1:1,000 aqueous, injectable epinephrine will be the actual allergenic extracts. The same extracts used for treatment will be employed in weak dilutions for intradermal testing.

The basic allergens, adequate for handling most patients in the average small clinic or hospital, are house dust, feathers, mold mix (Alternaria and Hormodendrum), tree pollen mix, grass pollen mix, and weed pollen mix. The tree, grass, and weed pollen mixes should contain the particular pollens found in the immediate area. A summary of important pollens by geographic regions is shown in table 1, and the physician wishing to learn in detail what pollens are present in his area may do so by consulting the standard textbooks of allergy,[2-7] or by writing to the Secretary, Pollen and Mold Committee, American Academy of Allergy, 208 East Wisconsin Ave., Milwaukee 2, Wis., for the complete pollen survey of the area.

Ideally, individual pollens rather than a mix should be used in testing and treatment, but it is more practicable to use mixes of the types described. Actually, in the case of grasses, most allergists believe that timothy pollen in itself contains sufficient common antigen for testing and treatment of patients sensitive to other grasses, so that timothy pollen extract can, if desired, be used in place of a grass pollen mix.

Most of the allergenic extracts that will be needed are listed in the standard medical supply catalogue. The medical officer may wish to order certain additional nonstandard items such as mixes of tree, grass, or weed pollens, or if he prefers he can make his own mixtures in the manner described in standard textbooks of allergy, using 1 ml each of various related antigens.

The extracts may be furnished in any of the commonly used strengths shown in table 2; *i. e.*, as milligrams of total nitrogen, protein nitrogen units (PNU), or dilution of weight by volume; and proper labeling and identification is mandatory. Extracts should be refrigerated constantly but never frozen. Their refrigerator-shelf life usually is about one year from date of manufacture.

METHODS OF TESTING

Both scratch testing and intradermal testing are widely used. Where a complete survey involving a large number of tests is

TABLE 1. *Summary of important pollens by geographic regions*

Geographic area	Spring	Summer	Fall
Eastern half of United States	Trees Ash Beech Birch Elm Oak Hickory Poplar or cottonwood Walnut Pecan**	Grasses Timothy* Orchard June or Kentucky blue Redtop Bermuda** Johnson** English plantain Sorrel	Ragweed family Giant ragweed Dwarf ragweed Cocklebur
Western Plains states	Trees Ash Birch Elm Oak Hickory Sycamore Poplar or cottonwood Willow Aspen Mountain cedar	Grasses Timothy June or Kentucky blue Orchard Redtop English plantain	Ragweed family Giant ragweed Dwarf ragweed Western ragweed Cocklebur Burweed marsh elder False ragweed Wormwoods or sages*** Chenopods Russian thistle Burning bush Lamb's quarter Pigweed

TABLE 1. *Summary of important pollens by geographic regions*—Continued

Geographic area	Spring	Summer	Fall
Southwestern states	Trees Ash Poplar or cottonwood Willow Pecan Mountain cedar**** Mesquite*****	Grasses Bermuda Johnson Sudan Redtop	Ragweed family Burweed marsh elder Chenopods Russian thistle Burning bush Palmer's amaranth
Pacific states	Trees Alder Oak Cottonwood Walnut Plane tree or western sycamore	Grasses Orchard June or Kentucky blue Rye or wild rye Velvet Bermuda	Ragweed family Western ragweed False ragweed Artemisia genus Sagebrush Mugwort Chenopods Red root pigweed Russian thistle

*North of Ohio River
**South of Ohio River
***From five to seven varieties
****Only in Central and Southern Texas
*****Only in Western Texas

required, or where the sensitivity of the patient is suspected to be great, most allergists prefer to employ the scratch method for preliminary screening, and reserve the intradermal method for more careful checking of suspected allergens that have not

TABLE 2. *Comparison of unit values of pollen extracts**

Units	Dosage Range	Comparative Values			
		Pollen Units	Total Nitrogen	Protein Nitrogen Units	Dilutions
Pollen unit extractive from 0.001 mg. pollen (Noon)	1		0.000016	0.64	1 cc. of 1:1,000,000
	10		0.00016	6.4	1 cc. of 1:100,000
	100		0.0016	64.0	1 cc. of 1:10,000
	1000		0.016	640.0	1 cc. of 1:1000
	10,000		0.16	6400.0	1 cc. of 1:100
Total nitrogen (Kjeldahl method)	0.00001	0.625		0.4	1 cc. of 1:1,600,000
	0.0001	6.25		4.0	1 cc. of 1:160,000
	0.001	62.5		40.0	1 cc. of 1:16,000
	0.01	625.0		400.0	1 cc. of 1:1600
	0.1	6250.0		4000.0	1 cc. of 1:160
Protein nitrogen 0.00001 mg. of protein nitrogen (Cooke and Stull)	1	1.5625	0.000025		1 cc. of 1:640,000
	10	15.625	0.00025		1 cc. of 1:64,000
	100	156.25	0.0025		1 cc. of 1:6400
	1000	1562.5	0.025		1 cc. of 1:640
	10,000	15625.0	0.25		1 cc. of 1:64
Dilutions weight of pollens per volume of extractive	1 cc. of 1:1,000,000	1	0.000016	0.64	
	1 cc. of 1:100,000	10	0.00016	6.4	
	1 cc. of 1:10,000	100	0.0016	64.0	
	1 cc. of 1:1000	1000	0.016	6400.0	
	1 cc. of 1:100	10,000	0.16	640.0	

*Reproduced from Tuft, L.: *Clinical Allergy.* 2d edition. Lea & Febiger, Philadelphia, Pa., 1949.

Pollen unit extractive averages 0.000016 mg. of total nitrogen.

Total nitrogen expressed in milligrams.

Protein nitrogen = total nitrogen (Kjeldahl) less nonprotein nitrogen (phosphotungstic acid method).

Protein nitrogen averages 40 per cent of total nitrogen.

produced a positive reaction by the scratch test. The program described in this article, however, is for handling the milder type of case, utilizing only a limited number of tests. For this purpose intradermal testing with proper dilutions of the same extract that may later be used for treatment is both practicable and advantageous. Physicians wishing to employ scratch tests

or other forms of diagnostic testing are referred to the detailed descriptions found in allergy textbooks.

LIMITATIONS OF SKIN TESTING

The limitations of skin testing as a diagnostic procedure are well recognized. The technic, though relatively simple, is subject to many pitfalls, and experience is needed for its proper application and for effective interpretation of the reactions obtained. For accurate results, interpretation must be by the individual performing the test.

It is common knowledge that the skin test is of diagnostic aid only in certain forms of allergic illness; namely, atopic diseases. The purpose of testing is to demonstrate the reagin or atopic skin-sensitizing antibody, and a positive skin reaction must always be correlated with the patient's clinical history. If this fact is kept in mind, one will not be misled into incorrect treatment of the patient by relying solely upon skin testing as the only diagnostic tool.

TECHNIC OF SKIN TESTING

Intradermal tests involve the introduction of an allergic extract into the superficial layers of the skin. The outer aspect of the upper arm is the site most favored for this test, although some workers use the forearm, thigh, or back. The advantages of the upper arm are ease of testing, uniformity of skin response, and ease of application of a tourniquet in event of a constitutional reaction.

The skin should be cleansed with 70 per cent alcohol and allowed to dry. The first injection should always be with buffered normal saline solution, in order to determine the reaction of the skin. Allergenic extracts are used only in dilutions which have been shown by experience to be relatively safe (table 3), and a 1:100,000 dilution or equivalent strength in other units should be used in patients with a history of extreme sensitivity. An antigenically clean and sterile syringe and needle are used to make an injection of 0.01 ml of test extract into the most superficial layers of the skin, producing a wheal about the size of a large pinhead. The area to be tested is drawn taut and the needle inserted with the bevel down and facing the skin. Only the point is inserted into the skin in order to minimize trauma and pain. When several tests are made they should be placed in well-spaced rows on the arm, each test being at least one and one-half inches from its neighbor horizontally, and three inches vertically. As a control, a similar injection of sterile diluting fluid is made at a neighboring site.

The reading time for intradermal testing ranges from 8 to 15 minutes, depending on the rapidity of wheal formation. A positive reaction consists of a wheal surrounded by erythema and accompanied by a variable degree of pruritus. A test is considered positive when it exceeds the control in size of wheal, size of erythematous area, or both. Positive skin reactions are graded arbitrarily as either 1, 2, 3, or 4 plus; or slight, moderate, marked, and marked plus. All positive tests should be repeated if possible. The tests should be performed *and* interpreted by the *same* person.

PRECAUTIONS IN SKIN TESTING

A 1:1,000 aqueous, injectable solution of epinephrine and a tourniquet should always be at hand during the performance of skin testing.

The number of tests performed at one sitting should be kept small. The stronger and the more rapid in onset the clinical symptoms, and the younger the patient, the fewer the tests it is safe to make at one time and the weaker the safe testing strength.

The stronger the suspected sensitivity to an allergen, as judged by the history, the weaker the testing strength should be and the more cautious the testing.

Always err on the safe side; don't endanger the patient in order to prove a point.

CLINICAL APPLICATION

The history of the patient's allergy must be thorough and complete, to serve as a guide to necessary diet study and dust precautions and to proper skin testing, diagnosis, and treatment. Essential information includes date and place of first attack, and whether present symptoms are severe or mild, continuous or paroxysmal, perennial or seasonal, diurnal or nocturnal. Questioning should reveal occupation and all possible environmental contacts and precipitating factors such as animals, odors and fumes, drugs, tobacco, alcohol, foods, cosmetics, toys, house dust, bedding, furniture, climate and weather changes, infections, emotions, menses, and exertion. Allergic history should include treatment, with reactions and results; medical history should include immunizations, with dates received and reactions if any; and surgical history should give special attention to ear, nose, and throat.

The patient's symptoms are correlated with his particular pollen or mold season or with house dust, by study of the history, and appropriate testing is performed using the extracts in 1:10,000 or 1:100,000 equivalent dilution. If these weak dilutions reveal

mild reactions, the patient is then tested with the next higher concentrations. The end point is reached at the dilution that will produce a marked plus or 4 plus reaction. The patient's reactions are then classified as A, B, or C (table 3).

TABLE 3. *Outline of classification and treatment schedule in hay fever (modified for clinic use from Cooke's original table)**

Method of Classification: Test patient routinely with 0.0001N (or 10 pollen or protein units) and with 0.001N (or 100 pollen or protein units) solutions. If neither of these show marked reactions (with pseudopodia), test on same day with 0.01N (or 1000 pollen or protein units) solution. Otherwise omit this test. Classify patients for treatment as follows:

Marked reaction to	0.0001—Class A
Marked reaction to	0.001 —Class B
Marked reaction (or less) to	0.01 —Class C

Begin treatment according to following schedule. Only in Class C patients is it safe to give the initial dose on the same day as the testing.

Treatment Schedule

Class A			Class B			Class C		
Amount in cubic centimeter	Solution	Dose in N	Amount in cubic centimeter	Solution	Dose in N	Amount in cubic centimeter	Solution	Dose in N
0.1	0.0001N (1/10,000)	0.00001	0.1	0.001N (1/1000)	0.0001	0.2	0.001N (1/1000)	0.0002
0.2		0.00002	0.2		0.0002	0.4		0.0004
0.4		0.00004	0.4		0.0004	0.7		0.0007
0.7		0.00007	0.7		0.0007	1.0		0.001
1.0		0.0001	1.0		0.001			
0.2	0.001N (1/1000)	0.0002	0.2	0.01N (1/100)	0.002	0.2	0.01N (1/100)	0.002
0.4		0.0004	0.4		0.004	0.4		0.004
0.6		0.0006	0.6		0.006	0.7		0.007
0.8		0.0008	0.8		0.008	1.0		0.01
1.0		0.001	1.0		0.01			
0.15	0.01N (1/100)	0.0015	0.25	0.05N (1/20)	0.0125	0.15	0.1N (1/10)	0.015
0.2		0.002	0.3		0.015	0.2		0.02
0.3		0.003	0.4		0.02	0.3		0.03
0.4		0.004	0.5		0.025	0.4		0.04
						0.6		0.06
						0.8		0.08
						1.0		0.10

*Reproduced from Tuft, L.: *Clinical Allergy* 2d edition. Lea & Febiger, Philadelphia, Pa., 1949.

Note.—The interval between injections should be four to seven days depending upon the patient's tolerance. If a marked local reaction or general symptoms occur, the dose should be decreased and maintained at that level and slowly increased later.

The schedule given above is for the average patient; if the patient has greater tolerance, the dose should be increased accordingly; if less tolerance is shown the reverse is true.

In treatment, the site of injections should be in the upper arm if possible. One must be careful to avoid constitutional reactions, severe local reactions, and intravenous injection of the extract.

The interval between injections should be four to seven days, depending on the patient's tolerance. If a marked local or general reaction occurs, the dose should be decreased and maintained at the lower level for several doses, after which it may be slowly increased. The schedule listed in table 3 is for the average patient, and the dose must be regulated according to the individual's tolerance. When the "top dose" (the highest *safe* dose) is reached, it may be given at more widely spaced intervals until the patient is taking his injections at two- to three-week intervals.

In the case of a patient with perennial symptoms who must be treated with house dust and molds, the patient may be started on his extract, as with pollens, at four- to seven-day intervals. The schedule for treatment with house dust should be obtained from the manufacturer for each brand, as there is some variation in this type of allergen and a standard schedule is not applicable to all. In the case of molds, the mold season for the area must be known before treatment is instituted.

There are three primary treatment schedules which may be followed with pollens. In the first or coseasonal type of therapy, the patient first comes to the physician during the pollen season. At this time the patient is given a "skin test dose" (0.01 ml or 0.02 ml) of the particular pollen extract intracutaneously at two-day intervals until the end of his pollen season. After the pollen season is over, the patient may have his dose built up as outlined in the perennial schedule.

In the second or preseasonal type of therapy, the patient is started on his treatment injections several months prior to the beginning of the particular pollen season, and treatment is abruptly stopped at the onset of the season. This therapy may be repeated every year.

The third method is the perennial type of therapy. The patient is started on his injections as previously described, but injections are reduced by 5- to 10-dose increments during the pollen season and then gradually built up again to the "top dose" when the season is over. During the pollen season one must be on the alert for the possibility of a constitutional reaction. Such a reaction may also occur at any time from overdosage, so that a tourniquet and epinephrine solution must be available at all times. It is important to remember that the patient with an allergy may have increased symptoms within 36 hours after an injection of antigen. These delayed reactions may occur in the absence of any local reaction at the site of injection. When they do occur the dose levels should be reduced, and only gradually increased after a suitable period of time such as one month.

DISCUSSION

This program of allergy treatment for use in the small clinic or hospital is simply outlined in general terms, and for detailed information it is recommended that standard textbooks of allergy be consulted. It is believed that the treatment and testing extracts listed as basic for the average patient will cover almost any type of allergic situation where hyposensitization will be used. Vaccine therapy has been deliberately omitted because of the current controversy over stock versus autogenous vaccines.

The history of the patient's allergy is perhaps the most important diagnostic tool with which the physician has to work, and determines the schedule of treatment. A program consisting of a complete history, proper diet study, dust precautions, limited skin testing with the extracts mentioned, and proper hyposensitization will allow the average physician in the small clinic or hospital to diagnose and treat the routine allergy patient with satisfactory results. Again it must be emphasized that this program is not intended to take the place of a full-scale allergy clinic but rather to provide a limited program for those facilities where allergy care is now nonexistent.

SUMMARY

A program for the diagnosis and treatment of allergies in the small military medical facility has been outlined. This program should enable the average military physician to organize a small-scale allergy clinic where acceptable standards of diagnosis and treatment may be attained. This provision of allergy care for military personnel and dependents will provide a type of care previously unavailable at smaller installations.

REFERENCES

1. Department of the Army: *Allergy.* TB Med 202, Jan. 1950.

2. Cooke, R. A.; Baldwin, H. S.; and others: *Allergy in Theory and Practice.* W. B. Saunders Co., Philadelphia, Pa., 1947.

3. Criep, L. H.: *Essentials of Allergy.* J. B. Lippincott Co., Philadelphia, Pa., 1945.

4. Feinberg, S. M.; Durham, O. C.; and Dragstedt, C. A.: *Allergy in Practice.* 2d edition. Year Book Publishers, Inc., Chicago, Ill., 1946.

5. Sheldon, J. M.; Lovell, R. G.; and Mathews, K. P.: *A Manual of Clinical Allergy.* W. B. Saunders Co., Philadelphia, Pa., 1953.

6. Tuft, L.: *Clinical Allergy.* 2d edition. Lea & Febiger, Philadelphia, Pa., 1949.

7. Vaughan, W. T.: *Practice of Allergy.* 2d edition, revised by J. H. Black. C. V. Mosby Co., St. Louis, Mo., 1948.

POTENTIAL INTELLIGENCE TESTING

A Case Study

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FROM both a clinical and a theoretical point of view, it is useful to distinguish between a measured intelligence score (I. Q.) and some "potential" score that a patient is presumed capable of obtaining. A recent article[1] proposed general principles which related a learning theory description of potential intelligence to certain specific problems in clinical psychology (*viz.*, dimensions of intelligence, the growth of intelligence, the meaning and measurement of mental deficiency, the evaluation of the extent and nature of psychologic interference, and psychotherapy). Clinical hypotheses may be derived from these principles.

This article illustrates how the obtaining of an index of potential intelligence level makes it possible to develop clinical hypotheses regarding an individual case. The resulting hypotheses are clinical inferences about the patient rather than precisely stated, experimentally verifiable hypotheses. As a preface to the case report, a brief summary is given of a learning theory approach to potential intelligence and some methods of measurement.

LEARNING THEORY APPROACH TO POTENTIAL INTELLIGENCE

It is presumed that based on an individual's previous experiences a number of answers to any single intelligence-test question are possible. Each possible answer is termed a *behavior.* Within the framework of Rotter's[2] social learning theory, each possible answer (behavior) may be described in terms of *behavior potential.* This is defined as ". . . the potentiality of any behavior's occurring in any given situation or situations as calculated in relation to any single reinforcement or set of reinforcements."

In any given testing situation, there is presumed to be a set of behaviors (possible answers) for each question, and the be-

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haviors in any single set vary in behavior potential from high (with the greatest relative potentiality for being verbalized) to low (with low potentiality for being verbalized). Each set of behaviors has one behavior (answer) with the highest potential. Taken together, these behaviors may be said to be at the first *level of behavior*. The behaviors with the next highest behavior potential in each set are said to be at the second level of behavior, and so on for succeeding levels of behavior. A "lower" level of behavior is lower in availability, accessibility, and potentiality for being verbalized.

It should be noted that the term levels of behavior refers to a continuum of decreasing behavior potential. The differences between levels of behavior may be slight or great. The lower the level of behavior, the lower is the potential of behaviors at that level relative to those of other levels.

The standard method of administering and scoring elicits a single answer to a single question; in other words, it bases the I. Q. score on the first level of behavior. Although the Wechsler-Bellevue test provides for alternative "equally good" responses and responses of varying quality, the examinee is asked to give one response to each question. The I. Q. score calculated in this manner is termed the *standard intelligence* score and is obtained by following Wechsler's manual for Wechsler-Bellevue, Forms I and II.[3] In contrast, scoring may be based upon the *set* of behaviors to each question or, in other words, upon all levels of behavior (all possible answers). This is termed the *potential intelligence* score.

SOME METHODS OF MEASURING POTENTIAL INTELLIGENCE

A method of measuring potential intelligence has been derived from the learning approach.[1] This method answers the general question, "What I. Q. score is the patient capable of attaining?" Two other methods were used with the present patient. Wechsler's deterioration index[3] asks a more pointed question, "What was the patient's I. Q. score before deterioration, impairment, or decline?" Jastak[4] proposed a method of estimating "altitude" intelligence, which is presumed to be related to native endowment. Whiteman[5] further refined this method for clinical use. These three methods were used in the case reported.

The potential intelligence method elicits a set of behaviors (answers) for each item in the following Wechsler-Bellevue verbal subtests: information, comprehension, arithmetic, similarities, and vocabulary. Scoring is based on the most correct answer among the set of answers to each question. The technic of po-

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tential intelligence testing is also applicable to nonverbal behavior. However, the specific performance subtests of the Wechsler-Bellevue were excluded because of the large role played by speed of response and the grasping of an over-all principle.

Following the standard administration (based upon level of behavior 1), the patient is encouraged to give additional answers to each incorrectly answered question. After the patient gives a set of additional answers to the missed item, the examiner proceeds to the next missed item, and so on through the test. If a more correct answer is included among these additional answers, potential intelligence scoring is based upon that more correct answer rather than the first, incorrect answer.

Wechsler's deterioration index is based upon a comparison of the sum of Wechsler-Bellevue subtest scores which "hold" and those which "don't hold" with deterioration, impairment, or decline. According to Whiteman's refinement of Jastak's method for measuring intellectual altitude, the equivalent of 10 subtests is obtained by multiplying the highest subtest by 5, the second highest by 3, and the third highest by 2. The I. Q. score thus calculated is a measure of intellectual altitude.

CASE REPORT

A 21-year-old, unmarried, white serviceman was referred to the psychology service because of amnesia, perplexity, auditory hallucinations, ideas of reference, mild delusions of persecution, bizarre activity, confusion, and illogical thinking. The final diagnosis was schizophrenic reaction.

On the standard Wechsler-Bellevue Intelligence Test, the patient's full scale I. Q. was 47, the performance scale I. Q. was 43, and the verbal scale I. Q. was 59. Weighted scores for five verbal subtests are given in the top row (level of behavior 1) of table 1.

The levels of behavior 2 through 6 refer to the five additional answers given to questions incorrectly answered under the standard administration. With these potential intelligence data, the following clinical hypotheses may be drawn.[1]

DISCUSSION

Probable Intelligence Level Before the Onset of Symptoms

It is useful to estimate whether the present standard verbal scale I. Q. score of 59 represents the patient's probable level of functioning before the onset of symptoms, or, in other words, if he functioned in the mentally deficient range before the onset of symptoms. One clue to this presymptom level is the potential I. Q. If this is also in the mentally deficient range, the hypothesis

is that the presymptom level was also in the deficient range. Another clue is the potential I. Q. score at the second or third levels of behavior. The hypothesis here is that if these potential I. Q. scores are so "available," they probably represent a fair estimate as to the presymptom intelligence level.

TABLE 1. *Standard and potential weighted scores on five Wechsler-Bellevue verbal subtests*

Level of behavior	Information	Comprehension	Arithmetic	Similarities	Vocabulary	Verbal I. Q.
1	4	2	3	3	2	59
2	5	4	6	11	5	80
3	8	7	9	11	7	94
4	9	7	9	13	7	97
5	10	8	9	13	8	101
6	10	9	9	13	9	104

In this case, the potential I. Q. at level of behavior 6 was 104. Potential I. Q.'s at levels of behavior 2 and 3 were 80 and 94, respectively. The hypothesis then is that this patient's I. Q. of 59 is probably not representative of his presymptom level of functioning, and that his presymptom level was probably in the dull normal to average range.

The Nature of Potential Intelligence

An important step in intelligence test analysis is the investigation of the profile of high and low scores. One general principle, stated as an hypothesis, is that the "kind" of intelligence varies with different levels of behavior. Applied to a single protocol, the hypothesis is that there is no necessary relationship between the relative scores of the subtests at different levels of behavior; the "high's" of one level may be the "low's" at another. The profile of skills and abilities at one level may be quite different from that at another level; an analysis of subtests at level of behavior 1 gives little information about the skills and abilities at lower levels.

Under standard intelligence testing (level of behavior 1), only 2 points separate the "high" (information) from the "lows" (comprehension, vocabulary). Under potential intelligence testing, a new "high" subtest emerges (similarities), and the "lows" change moderately (comprehension, arithmetic, and vocabulary), with 4 points now separating the "highs" and the "lows." The clinical hypotheses are that (1) the profile of subtest scores at

lower levels of behavior differs moderately from the profile at level of behavior 1; (2) there is greater variability of subtest scores, and presumably skills and abilities, at lower levels of behavior; and (3) whatever skills, abilities, and personality structure are tapped by the similarities subtest appear to be "available" and potentially high, but unexpressed at the present time.

The Mentally Deficient Classification

Two kinds of mentally deficient classifications were supported.[1] One classification was reserved for those who are functioning at a defined low level and whose potential intelligence score also falls within the deficient class. The other classification is for those whose standard I. Q. is below the deficiency point, but whose potential intelligence rises above that point. The criterion for placing an individual in either classification is the potential intelligence score.

The potential intelligence score of the patient discussed rose above the mentally deficient range at level of behavior 2 (I. Q. 80), and scores at lower levels of behavior increased appreciably beyond the I. Q. of 80. Therefore, the clinical hypothesis is that although this patient is presently functioning in a mentally deficient range, he is not a "true" defective, in that a higher level of intellectual functioning is "available," and he probably did not function in the mentally deficient range in the past.

The Prediction of Behavior

An important use of intelligence tests is to help in the prediction of a patient's response to a variety of situations. In the experimental laboratory these situations may include both simple and complex learning tasks. In the clinical setting these situations may include long or short-term psychotherapy, the learning of language skills, social skills, the development of mechanical skills, retraining, re-education, and many other situations where the intelligence level presumably plays some part. The general hypothesis here is that, other factors being equal, with patients of similar standard I. Q., the response to such learning situations will correspond to the potential intelligence scores.

This patient's potential intelligence score at levels of behavior 2 (I. Q. 80) and 6 (I. Q. 104) suggest that there are available responses at the dull normal or possibly normal level. In comparison with patients of identical standard I. Q. (59), but lower potential I. Q., this patient would probably respond "better" to learning situations.

Potential Intelligence, Native Endowment and Impairment

If a deterioration index is calculated from the data of table 1, the prorated "hold" sum is 5.3, and the "don't hold" sum is 6. This yields a questionable deterioration loss of −10 per cent, suggesting that no deterioration loss has occurred. The deterioration index may actually be a spurious measure with these data because it was calculated on the basis of only 5 of the 10 subtests suggested by Wechsler.

Jastak's intellectual altitude may be calculated using Whiteman's weighting system. If this weighting system is applied to five verbal subtests, presumably the three highest scores are multiplied by 2½, 1½, and 1, respectively. This yields a "native endowment" or "intellectual altitude" verbal I. Q. of 63. However, as with the deterioration index, these results may be spurious inasmuch as they are based on 5 subtests rather than 10, and because a questionable weighting system was used.

Nevertheless, these three measures offer apparently conflicting clinical hypotheses. Potential intelligence testing suggests that the patient is functioning from 21 to 45 I. Q. points below either a previous level or some theoretically potential level. In contrast, the deterioration index suggests no deterioration loss, and Jastak's method implies that the I. Q. score of 59 stands in relation to an "intellectual altitude" or "native endowment" I. Q. of 63. Such contradictory clinical hypotheses would seem to call for research to explain the differences. This case seems to demonstrate the impropriety of using the three measures interchangeably. Additional indexes of the potential intelligence level might include educational level, school grades, previous intelligence tests, and similar criteria.

Evaluation of the Extent of Interference

One hypothesis is that the amount of interference is proportional to the amount of increase of potential over standard I. Q. In the case reported, the difference of 45 I. Q. points must be interpreted in relation to norms. A study of 60 neuropsychiatric patients at this hospital resulted in a mean difference of potential I. Q. over standard I. Q., of 16 I. Q. points, with a standard deviation of 7 points. On the basis of these limited norms, it appears that relatively high interference is present in this patient.

Another hypothesis is that the lower the level of behavior at which the potential I. Q. reaches a maximum and begins leveling off, the greater the interference. Until systematic norms are available, interpretation must rely on more personal and nebulous clinical experience. It appears that the leveling-off of potential

I. Q.'s occurred between levels of behavior 3 to 6, and that the largest differences occur between levels of behavior 1 and 2 or 3. This implies that a higher level of functioning (in the dull normal or low-average range) is moderately accessible or available. Tentatively, this hypothesis further suggests that, in a broad sense, prognosis is moderately favorable.

Evaluating the Nature of the Interference

The evaluation of the nature of the interference may be guided by the hypotheses that behaviors of higher potential (at higher levels of behavior) than the correct behavior provide information on the nature of interfering factors. The nature of these factors may vary with each level of behavior. What is commonly accepted as a "correct" answer may not be elicited because of the greater relative potential of other answers. The following clinical hypotheses attempt to assess what factors may be operating to elicit these other answers.

At the first level of behavior, there were suggestions of passive-aggression (*e. g.*, spontaneous comments such as "You've got me . . . Why are you asking me these things? . . . I'm no genius, how should I know? . . . I don't know. I ain't no shoe-man" to comprehension item 5), of impulsivity (*e. g.* "Run" to comprehension item 2), and a perseverative stimulus-repetition (*e. g.* to vocabulary items 2, 6, 10, and 11, respectively: "A donkey means a donkey . . . fur means fur . . . bacon means bacon . . . nail means nail"; to information item 11, "Brazil is in Brazil").

The second level of behavior also reflected passive-aggression and impulsiveness, but the perseverative stimulus-repetition was not found, nor did it appear again at lower levels of behavior. However new factors appeared. These included impotence (*e. g.*, to information items 10, 12, and 13, and to similarities items 6 and 7: "I used to know . . . I can't think the way I used to . . . Seems like I should know that . . . I feel like I can't think . . .") and a fear of punishment (*e. g.*, comprehension items 3 and 8, respectively: "I'd get in trouble and really get it . . . Otherwise they'd be punished").

The fourth level of behavior was characterized also by passive-aggression and impulsivity, but feelings of impotence and the fear of punishment were expanded to include general avoidance behaviors (*e. g.*, arithmetic item 9: "I just don't want to think"; vocabulary item 8: "That word scares me, I don't know why."; similarities item 10: "I don't understand anything, the words don't seem right.").

Levels of behavior 5 and 6 reflected fewer signs of interference. However, this level reflected more direct aggression (*e. g.*,

"How the hell should I know? . . . a habeus corpus is a murdered guy . . . Hara-kiri is like brass knuckles . . .") and personalized associations (*e. g.*, similarities 10: "A poem and a statue they tried to learn me"; comprehension item 7: "If I was lost I'd tear all the trees apart"; vocabulary items 23 and 25: "A vesper is a stick to keep kids in line . . . recede means getting drunk and never coming home").

It appears that major interferences include passive-aggression and impulsivity at nearly all levels, and a perseverative stimulus-repetition at level of behavior 1. Feelings of impotence and a fear of punishment appeared at levels 2 and 3. Generalized avoidance behaviors appeared at level 4, and levels 5 and 6 were comparatively free of interference except for some direct aggression and personalized associations. It seems that different levels of behavior give rise to characteristic kinds of interference.

SUMMARY AND CONCLUSIONS

A patient was reported whose measured (standard) Wechsler-Bellevue Intelligence Scale I. Q. scores were: verbal, 59; performance, 43; and full scale I. Q., 47, all scores falling in the mentally deficient classification. A learning theory approach to the concept of "potential intelligence" was summarized, and some methods of measuring potential intelligence briefly described. The purpose of the report was to illustrate how obtaining an index of potential intelligence offered the following clinical hypotheses:

1. The patient's verbal I. Q. of 59 probably is not representative of his earlier, presymptom level of functioning.

2. He probably functioned earlier at the dull normal or average range.

3. At lower levels of behavior (*i. e.*, "latent" or "less available") he shows a greater variability of skills and abilities.

4. Whatever skills and abilities are tapped by the similarities subtest appear to be "available" and potentially high, but unexpressed at present.

5. Although this patient is presently functioning in the mentally deficient range, he is not a true defective in that a higher level of intellectual functioning is "available," and he probably did not function in the mentally deficient range in the past.

6. Responses to learning situations are available at a dull normal or possible normal level. In comparison with patients of identical standard I. Q. but lower potential I. Q., this patient would respond "better" to learning situations.

7. The deterioration index, the measurement of "intellectual attitude," and the potential intelligence score seem to give rise to different clinical hypotheses.

8. A high degree of interference seems to be operating.

9. A higher level of intellectual functioning (in the dull normal or average range) is moderately accessible or available.

10. Major interfering factors at all levels include impulsivity and passive-aggression. A perseverative stimulus-repetition is observable. At intermediate levels of behavior new interfering factors appear: feelings of impotence, a fear of punishment, and generalized avoidance behaviors. Still lower levels of behavior give rise to direct aggression and personalized associations as interferences.

This case illustrated how clinical hypotheses regarding a single patient may be derived from some general principles. Further research is needed to test the usefulness of potential intelligence analysis by testing clinical hypotheses which can be obtained by such an analysis.

ACKNOWLEDGMENT: The author expresses his thanks to Captain Lyle Wharton, MSC, USA; Captain Irwin Sternlicht, MSC, USA; 1st Lieutenant Robert Nichols, MSC, USA; and Miss Maureen Moffett for their assistance.

REFERENCES

1. Mahrer, A. R.: Potential intelligence; learning theory approach to description and clinical implication. To be published in *J. Gen. Psychol.*

2. Rotter, J. B.: *Social Learning and Clinical Psychology.* Prentice-Hall, Inc., New York, N. Y., 1954. p. 105.

3. Wechsler, D.: *The Measurement of Adult Intelligence.* 3d edition. Williams and Wilkins Co., Baltimore, Md., 1944.

4. Jastak, J.: Plan for objective measurement of character. *J. Clin. Psychol.* 4: 170-178, Apr. 1948.

5. Whiteman, M.: Altitude as a reference point in scatter analysis. *J. Clin. Psychol.* 6: 160-164, Apr. 1950.

Clinicopathologic Conference

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HYPERTENSION AND HEMATEMESIS

Summary of Clinical History. A 40-year-old, fairly well-developed white man was admitted to the hospital on 16 January 1952 with a chief complaint of pain along the lateral aspect of the right thigh since 15 November 1951, following a skin graft from the right thigh to the left ankle for a burn of the left ankle. The patient had been known to have hypertension for the previous five years, but it had never been evaluated. Three months prior to admission he noted headaches, blurred vision, spots before the eyes, mild exertional dyspnea, weakness, and intermittent disorientation. Six days prior to admission he had shortness of breath on exertion lasting five minutes, accompanied by a regular type of palpitation. He denied dyspnea at rest, orthopnea, wheezing, asthma, chest pains, and pedal edema. The patient had a slight nonproductive cough of two weeks' duration, but denied having hemoptysis. The only urinary symptom was nocturia, two times per night.

Eight months prior to admission, the patient had occasional vague abdominal pain. A gastro-intestinal series at that time revealed no abnormalities. Otherwise, his past history was negative.

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His father died at age 65 with "kidney trouble," and his mother died at age 73 with "high blood pressure." Four siblings were living and well. There was no known history of diabetes, cancer, tuberculosis, or lung or blood disease in his family.

Physical Examination. The patient was a slightly emaciated man appearing 15 years older than his stated age of 40 years. Blood pressure was 240/170 mm Hg; temperature, 98°F; pulse, 80/min.

Funduscopic examination revealed some increase in light reflex of the arterioles, with definite A-V nicking and one patch of white exudate in the right retina. Disk margins were sharp. The trachea was in the midline. The chest was slightly increased in posteroanterior diameter. The cardiac rate and rhythm were regular. The pulmonic second sound equaled the aortic second sound. In the sitting position, there was a harsh, early systolic, grade 2 apical murmur; this was less intense in the recumbent position. The lungs were clear to percussion and auscultation, but breath sounds were slightly distant. The abdomen was concave, soft, and nontender. No masses or viscera were palpable. No costovertebral angle tenderness was present. Examination of the peripheral vessels revealed no evidence of sclerosis or varicosities, and no peripheral edema was present. The skin was clear and slightly dry.

Neurologic examination revealed cranial nerves to be grossly intact; there was no marked deviation from normal in reflexes. All modalities of peripheral sensation were intact and equal bilaterally. Vasomotor lability was demonstrated by marked, cold hyperhydrosis.

Laboratory Studies. Hemoglobin was 14 g/100 ml; hematocrit, 48 ml/100 ml; erythrocyte sedimentation rate, 31 mm/hour; and white blood cell count, 9,400/μl, with a normal differential count. Bleeding time was 5 minutes, 50 seconds; coagulation time, 5 minutes, 5 seconds. The VDRL test was negative. Urinalysis was normal except for 2+ albumin; urine concentration test showed a specific gravity of 1.020 with volume of 260 ml; phenolsulfonphthalein test showed 55 per cent dye excretion in 50 minutes. Blood chemistry was as follows: uric acid, 2.8 mg/100 ml; plasma lipid phosphorus, 13 mg/100 ml; nonprotein nitrogen, 40 mg/100 ml and 33 mg/100 ml; glucose (fasting), 97 mg/100 ml; total cholesterol, 245 mg/100 ml; serum sodium, 147 meq/l; serum chloride, 105 meq/l; serum potassium, 4.4 meq/l; total serum protein, 6.7 g/100 ml. Vital capacity was 97 per cent of normal; piperoxan hydrochloride test with 17 mg of Benodaine Hydrochloride, initial blood pressure, 195/145 mm Hg, final blood pressure, 220/160 mm Hg; hyperventilation test, initial blood pressure, 220/110 mm Hg, final blood pressure, 210/160 mm Hg.

On 18 January, an intravenous pyelogram showed a normal excretory pattern in both kidneys; pelves and calyces were normal. A roentgenogram of the chest showed a fracture of the 9th rib posteriorly on the left and of the 9th and 10th ribs posteriorly on the right, but these did not appear to be recent. There was a calcified lesion in the 7th interspace on the right surrounded by a zone of reaction. The heart was within normal limits.

An electrocardiogram on 30 January showed an abnormal pattern in RS-T and T waves, which probably represented coronary insufficiency superimposed on left ventricular hypertrophy.

Course in Hospital. The patient was placed on a Kempner's rice diet, after it was established that good kidney function was present. The blood pressure dropped to 180/110 mm Hg on medical treatment. On 8 February a sympathectomy was done on the right side, from D-5 to L-2, and the patient did well postoperatively. The blood pressure came down to 140/95 mm Hg, but gradually rose again so that by March it was ranging from 200/175 to 120/100 mm Hg. Laboratory studies during this postoperative period showed that the hemoglobin was 12 g/100 ml; hematocrit, 39 ml/100 ml; erythrocyte sedimentation rate, 35 mm/hour; and leukocyte count, 7,300/μl, with 70 per cent neutrophils, 20 per cent lymphocytes, 6 per cent eosinophils, and 4 per cent monocytes. Bleeding time was 2 minutes, 15 seconds; coagulation time, 5 minutes. Urinalyses were negative. Total protein was 6.06 g/100 ml (albumin, 4.48 g/100 ml, globulin, 1.58 g/100 ml); and albumin-globulin ratio, 2.83.

Roentgenograms of the chest from 10 to 27 February showed the following: On 10 February a pneumothorax space overlying the right upper lung field was present. There was also some postoperative reaction about the left lower lung field. On 12 February there was some decrease in the pneumothorax space on the right, and the right lower lobe still appeared to be collapsed. Fluid was present in the right side of the chest. On 19 February the previously described collapse of the right lower lobe was more posterior in the chest, and most likely was an empyema along the paravertebral gutter. Fluid from the retropleural space was negative on smear and culture. A lateral study showed some depression of the right middle lobe fissure; some partial atelectasis possibly was present in the right upper lobe. On 27 February obliteration of the pneumothorax space on the right had occurred, leaving some residual pleural thickening. The left lung was clear.

An electrocardiogram on 9 February again showed left ventricular hypertrophy. The RS-T-wave depression in V_5 and V_6 had

increased, and possibly represented myocardial subendocardial ischemia.

On 4 March, a sympathectomy was done on the left side, from D-4 to D-12. Convalescence was satisfactory. Postoperatively on 4 March the erythrocyte count was 4,920,000/μl; hemoglobin, 12.5 g/100 ml; and hematocrit, 41 ml/100 ml. The urine was normal. Postoperatively the blood pressure ranged from 135/78 to 125/72 mm Hg. A roentgenogram on 5 March revealed clear lung fields and no pneumothorax; one on 10 March showed a pneumothorax over the left upper lung field. Continued absorption of the retropleural fluid on the right had occurred.

On 15 March the hemoglobin was 13 g/100 ml, and blood pressure was 168/90 mm Hg. However, the next day the patient vomited bloody fluid, and the gastric contents were positive for blood. The hemoglobin dropped to 5 g/100 ml and the erythrocyte count to 1,260,000/μl. The total serum protein was 6.1 g/100 ml (albumin, 4.0 g/100 ml, globulin, 2.1 g/100 ml) with an albumin-globulin ratio of 1.9. Despite repeated transfusions—from one to three daily—hemoglobin remained at from 5 to 7 g/100 ml. Blood pressure dropped to an average of 110/76 mm Hg.

A roentgenogram of the chest on 17 March showed considerable reduction in the amount of pleural fluid over the left lung field; however, some fluid remained at the left base. Continuing diminution in the amount of retropleural fluid on the right was noted.

On 18 March the patient had a syncopal attack when he arose to go to the bathroom. He was sweating profusely, appeared weak, and complained of chest pain on the left side. Blood pressure was 80/0 mm Hg; pulse, 100/minute; and respirations, 26/minute. Physical examination at that time revealed breath sounds present throughout the lungs with no marked hyperresonance and no evidence of cardiac shift.

On 19 March, laboratory studies showed that the hemoglobin was 5 g/100 ml; erythrocyte count, 1,720,000/μl; leukocyte count, 16,200/μl, with 87 per cent neutrophils, 5 per cent lymphocytes, 4 per cent stab cells, and 4 per cent monocytes. The urine was yellow, clear, and acid, with a specific gravity of 1.010, and was negative for albumin, sugar, and acetone; microscopically there were 2 white blood cells per high power field. The electrocardiogram remained abnormal; however, since the previous tracing the RS-T and T waves in aVF and left precordium had returned to a more normal configuration.

On 20 March blood pressure ranged around 70/0 mm Hg; pulse was 150/minute and of weak quality. The patient had no pain, but complained of "fullness in the stomach" and weakness, and

was perspiring profusely. He remained afebrile. Physical examination at 0330 hours revealed a cold, clammy skin, and palpation of the abdomen revealed periodic rushes of peristalsis with associated nausea. By 0500 blood pressure had risen to 110/78 mm Hg and pulse had dropped to 122/minute.

At 2400 on 21 March, the patient went into deep shock and was given blood transfusions, Neo-Synephrine Hydrochloride (brand of phenylephrine hydrochloride), and positive-pressure oxygen to no avail. The patient died at 0520 on 22 March.

DISCUSSION

Doctor Abbot:* The electrocardiogram showed left ventricular hypertrophy. After his work-up it was believed that the man had a malignant or premalignant type of essential hypertension, and he was prepared for sympathectomy. He was put on a Kempner's rice diet and his blood pressure came down somewhat. He had a two-stage thoracolumbar sympathectomy, the first, from D-5 through L-2, on 8 February. He had what I would assume to be the usual postoperative course with some fluid in his chest and some pain. His blood pressure fell transiently and then returned to more or less preoperative levels. He had a similar operation on the other side on 4 March, about a month later, and his immediate postoperative course was again relatively uncomplicated. His blood pressure came down to normotensive levels and remained there. Electrocardiograms taken during these postoperative periods were said to show changes consistent with myocardial ischemia. According to the nurse's notes, he complained of anterior chest pain at times. It is hard to evaluate chest pain in someone who has had extensive procedures of this type, however, and I don't know that you can attach any significance to it. In any case, the electrocardiograms didn't show signs of recent myocardial infarction.

He first began to vomit dark-brown material on 15 March. Not too much stress was laid on that fact. He was nauseated from time to time and complained of some abdominal pain, but this wasn't a frequent complaint and he complained more of chest pain than of the other things. On 16 March he vomited at least 1,000 ml and probably a little more of coffee-ground-like material. His hemoglobin dropped dramatically—from 13 g/100 ml on the 15th, which would be the first day he began to vomit coffee-ground material, to 5 g/100 ml on the 16th—and thereafter it never was normal, although he got several transfusions. Whenever he got up he would have profuse sweating, a rapid pulse, and syncope. He complained of anterior chest pain rather acutely on 17 March, and also of pain in his stomach. However, over the next two days he felt better. On 21 March, seven days after he first began to vomit coffee-ground material, he had stools described as tarry and red. He went into

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syncope with a blood pressure of 80/0 mm Hg. In spite of Neo-Synephrine Hydrochloride and blood transfusions, he died fairly promptly.

Interestingly enough, gastro-intestinal bleeding after a neurosurgical procedure is not a rare thing. Most of these procedures are ones that involve the brain in one way or another, and have been thought, in the series that I have seen, to be concerned with the specific production of perhaps vagal stimulation, along the lines Cushing first laid down, causing peptic ulceration. I don't believe that this particular case falls into this category at all. I think we have to look back and think more seriously about his previous history of gastro-intestinal symptoms eight months earlier. These were vague stomach pains of such a degree that a gastro-intestinal series was done. What does one gastro-intestinal series mean? We all know that sometimes quite large, significant lesions can be missed on one gastro-intestinal series.

Statistically, the most probable lesion would be a duodenal ulcer, however. Of lesions causing bleeding or pain, that is the easiest to demonstrate by x-ray examination. Gastric ulcer is a possibility. Gastric cancer is a possibility. Hiatus hernia could certainly be present and missed. It could be missed on two or three gastro-intestinal series, only to be found after the fluoroscopist thinks about it and tries very hard to find it by various maneuvers of the gastro-intestinal series. Hold that in mind and then try to consider what has happened here. With a bilateral sympathectomy there is sensory denervation of the upper gastro-intestinal tract. Some of the men who began doing splanchnicectomies and more extensive sympathectomy procedures found early that people who had duodenal ulcers didn't get better, although they stopped having pain; the ulcers got worse, and there are numbers of cases of hemorrhage and perforation in the postoperative period without pain. There are also on record a gradually accumulating series of cases of patients who have not had pre-existing gastro-intestinal complaints, but who in a period following either extensive operative procedures or a severe illness will have ulceration and bleeding in the gastro-intestinal tract and this has been thought of as an adaptation breakdown type of disease. Curling's ulcer may be this type of thing, and certainly rather extensive erosive mucosal lesions have been found in the esophagus, stomach, duodenum, small bowel, and even large bowel in this type of case. That, however, is certainly more rare.

To my mind the important thing in this case is that a patient after sympathectomy can have a serious bleeding lesion in the gastro-intestinal tract which can be missed. I think that what killed this man was probably a peptic ulcer, most likely in the duodenum. Hiatus hernia might be considered as a second choice and, with this type of stress, gastro-intestinal erosion as a poor third.

Something else found by physiologists is an increase in gastric motility and probably of acid secretion after sympathectomy. This,

plus the stress of the operation, activated the ulcer, causing it to bleed. The bleeding was somewhat masked by the syncope which occurs after a bilateral sympathectomy. Not enough significance was laid to it, and the patient had no pain to localize it. In the terminal situation I think he was in irreversible shock. I think it is highly likely that he had myocardial ischemia. He may even have had myocardial infarction, precipitated by shock, for arteriosclerosis is usually considerable in people who are hypertensive.

Doctor Ginsberg:* My feeling about the hypertension in this patient is that it was adequately studied and that the patient had hypertensive cardiovascular disease for which sympathectomy is justifiable. The effects of the sympathectomy on this patient's subsequent course would in my mind be in effect this. He had a denervated upper abdomen at least. His left sympathectomy was incomplete, but this is routinely done by many surgeons in an attempt to prevent impotence in a male. We can at least say that he was partially denervated as far as abdominal visceral sensation was concerned, but probably not high enough to denervate his coronary blood supply, so that if he had had a severe coronary thrombosis we probably would have known about it. The phenolsulfonphthalein test was 55 per cent in 50 minutes, so we can document good kidney function, even in the presence of such severe hypertensive disease that sympathectomy was justified.

The review of the possible sources of the bleeding is entirely consistent with my own opinions. The only other possibility in my mind is that this man's hypertension, his initial finding, and his subsequent hemorrhage were due to some disease of the major blood vessels with a vascular enteric fistula. We have, to my mind, evidence of something occurring in the upper retroperitoneal or lower retropleural or mediastinal area. This possibility is further suggested by palpable pulses on examination, plus the pain that was the man's initial complaint. He had pain in the anterior part of the thigh, which suggests the possibility of occlusive disease of the terminal aorta—perhaps aneurysm with rupture. That is the reason I went into some detail about how much bleeding from this man's gastro-intestinal tract had occurred. It is very unlikely that, despite multiple transfusions, a man can bleed enough to reduce his hemoglobin from 13 to 5 g/100 ml without losing more blood through his colon. I would say that this suggests that he may have been depositing a considerable part of it in his retroperitoneal area or mediastinum. Therefore in my differential diagnosis I would say that the first likelihood would be peptic ulceration—either in the duodenum or stomach, or perhaps in the esophagus. Certainly an occult carcinoma of the stomach, diaphragmatic hernia, or severe gastritis could have caused the hemorrhage. Then there are such exotic disorders as lymphosarcoma of the gastro-intestinal tract and occult carcinoma

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of the colon, and I would like to include in my differential diagnosis aneurysmal rupture of a major blood vessel, probably the aorta.

Dr. Abbot's diagnoses:

1. Peptic ulcer in duodenum
2. Myocardial infarction
3. Arteriosclerosis

Dr. Ginsberg's diagnoses:

1. Hypertensive cardiovascular disease
2. Peptic ulceration in duodenum, stomach, or esophagus
3. Ruptured abdominal aortic aneurysm

PATHOLOGIC FINDINGS

Doctor Schaffer:* This 110-pound, somewhat emaciated man had well-healed scars in both flanks and a stab wound in the left chest for drainage purposes. When the abdomen was opened, the liver was approximately 7 cm below the costal margin. The stomach was markedly dilated. The left side of the chest had some fibrous adhesions and a thick layer of fibrin around the pleural surfaces, particularly in the left lower lobe. The right side of the chest had a hematoma in it, as was noticed on the x-rays, and it contained approximately 250 ml of old clotted blood.

The heart weighed 459 grams. The coronary arteries showed very severe atherosclerosis and very marked narrowing of the lumina, particularly of the right coronary, which had practically a complete occlusion grossly. Microscopically there were a few recanalized channels through an old organized thrombus. The left anterior descending and left circumflex arteries showed very severe narrowing. There was a 1.5-cm fibrous scar on the apex. In the anterior portion of the septum there was a 2-cm area of discoloration. Microscopically this area showed a few polymorphonuclear leukocytes and lymphocytes scattered between the fibers. The fibers showed evidence of early acute degenerative change. There was loss of striations with beginning hyalinization, and some of the nuclei were beginning to fade out.

The aorta showed very little atherosclerosis, with only a few plaques scattered throughout and practically no calcification. No aneurysm was found.

The lungs were somewhat heavy. The right weighed 560 grams, the left, 665 grams. The lower lobes on both sides had some increased firmness suggestive of mild pneumonitis. There were fibrinous and fibrous adhesions noted on both sides.

The liver weighed 2,000 grams, which is very sizable. There was a somewhat accentuated lobular architecture. Microscopically there

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was central lobular congestion and mild lymphocytic infiltration in the portal areas.

The kidneys were of normal size, the capsules stripped easily, and the surfaces were fairly smooth. Microscopically there was mild arteriolosclerosis.

The brain had a normal architecture throughout except in the right temporal lobe where there was a 2- by 3-cm area of old hemorrhage with old, dark, somewhat clotted blood.

The gastro-intestinal tract was filled throughout with large quantities of clotted and fluid blood. The stomach contained 3,000 ml of clotted and fluid blood. There was a 9-cm ulceration on the posterior wall of the stomach in the prepyloric area; the edges were slightly raised. In the base of the ulcer there was a 3-mm artery whose lumen was open and projecting into the base of the ulcer. This was dissected out and found to be the right gastroepiploic artery. Microscopically there was considerable collagenous scarring in the base of the ulcer. The small intestine contained large quantities of dark-red blood. The large bowel contained black, thick pasty material.

In summary, this was a hypertensive middle-aged man who had had a bilateral sympathectomy. Postoperatively a chronic ulcer broke down, and further ulceration penetrated his gastroepiploic artery, causing him to bleed to death. Along with that he had severe atherosclerosis and coronary insufficiency, which with anemia and shock led to early myocardial infarction. He had a small hemorrhage in his brain that produced transient symptoms.

Pathologic diagnoses:

1. Hypertension
2. Chronic gastric ulcer of prepyloric area, with penetration of gastroepiploic artery
3. Atherosclerosis and coronary insufficiency
4. Myocardial infarction
5. Intracerebral hemorrhage

Doctor Monroe: The problem of whether to do a sympathectomy upon a hypertensive patient is, at this time, I believe, in a different category than it was when this operation was performed. Now we have certain medications, namely the derivatives of rauwolfia—the reserpine that was isolated by CIBA—and our ganglionic blockers as demonstrated by Ansolysen Tartrate (brand of pentolinium tartrate), which perform a medical sympathectomy rather efficiently; thus we are able to handle a case of even malignant hypertension probably as adequately as the surgeon. This is no criticism, of course, as these drugs were not on hand at the time this procedure was done. At the present time I cannot think of any patient with essential hypertension whom I would refer for sympathectomy. I realize that there is a great deal of opinion to the

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contrary, but certainly I believe that, as we accumulate data on these drugs, sympathectomy will fall into disuse.

Doctor Tyson:* There are a few comments I would like to make with reference to the management of both hypertension and upper gastro-intestinal bleeding. First of all a sympathectomy, an extensive sympathectomy for hypertension, was first done a little over 20 years ago. Several years ago it was quite popular in the treatment of hypertension, especially in those cases that did not respond favorably to medical management. Hypertension has been classified roughly in four groups. In group 1 are patients with mild hypertension who can be treated very satisfactorily medically. In groups 2 and 3 are patients who do not respond to medical management. I feel that three or four years ago a sympathectomy was indicated for these patients. In group 4 are those patients with a fixed blood pressure, especially those with kidney damage and a high nonprotein nitrogen. I think a sympathectomy for the patients in group 4 was in most instances contraindicated. This patient would most probably fall into group 2 or perhaps in group 3. So, I feel definitely that in 1952 the sympathectomy on this patient was in order.

It has been emphasized that ulcers sometimes appear to be worse following sympathectomy. Three or four years ago the Mayo Clinic reported a series of about 900 cases of thoracolumbar sympathectomy.[1] In 20 of these, ulcer symptoms were manifested in the early postoperative period. About 17 of these had had previous ulcer symptoms. The authors could not conclude that this was significant and they could not draw any definite conclusions that sympathectomies do make ulcers worse, but it seems to be the general consensus that such is the case. In my limited experience I have had occasion to see two patients bleed from ulcers following sympathectomy. As far as the results of sympathectomy for hypertension are concerned it's difficult to find any statistics to go by, but after five years approximately 60 per cent of the patients in group 2 and about 20 per cent of the patients in group 3 have a significant reduction in blood pressure. I believe most authorities agree that the survival time of these patients is probably increased by sympathectomy. As Doctor Monroe has mentioned, within the past three years newer drugs have been developed which are very effective; I personally haven't seen a sympathectomy done in three years and don't care to do them. I think that for the most part it's a poor way of treating hypertension. Another surgical method of treating hypertension is adrenalectomy. Experimental work has been done on this problem in a good many places. I personally, at the University of Tennessee, operated on a number of dogs in which experimental hypertension was produced using Goldblatt's clamp. Total adrenalectomy was then performed and the dogs maintained on cortisone. We found that we could

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keep the blood pressure down for many months, sometimes more or less permanently, by this method. Subtotal and total adrenalectomy has been advocated in some centers for rapidly progressive cases of malignant hypertension. Doctor Bowers[2] at the Veterans Administration Hospital in Memphis has done a number of subtotal adrenalectomies on patients with severe malignant hypertension and seems pretty enthusiastic about it. It does seem to prolong life and to alleviate the symptoms in patients who survive the procedure.

Curiously enough, following sympathectomy many patients will feel better subjectively. Their headaches, dizziness, chest pain, shortness of breath, and other symptoms of hypertension will often regress even though the blood pressure may go back up after a few weeks or months. Another fact that might be mentioned is that, following sympathectomy, those patients who have previously been resistant to medical treatment seem to respond better to medical treatment.

REFERENCES

1. Hightower, N. C.; Morlock, C. G.; and Craig, W. McK.: Effect of sympathectomy on clinical course of peptic ulcer. *Proc. Staff Meet., Mayo Clin.* 25: 634-638, Nov. 8, 1950.
2. Bowers, R. F.: Personal communication.

EFFECTS OF SEDATION ON AIRBORNE PSYCHIATRIC PATIENTS

FRANKLIN H. ERNST, JR., *M. D.*

PSYCHIATRIC patients often present management problems in flight, and if they become assaultive can be sources of danger to the other occupants of an aircraft. The flight nurse frequently wonders whether or not certain of the patients should be resedated; if so, at what stage. In order to determine what our sedation was doing for the large numbers of closed-ward psychiatric patients being flown out of this base, to formulate criteria for resedation, and to compare the relative merits of amobarbital and phenobarbital, a study was carried out during the 12 months ending on 30 April 1953. It was thought that perhaps the effects of sedation might be improved by changing the medication from 0.4 gram of amobarbital sodium by mouth to 0.3 gram of phenobarbital sodium in glycerin intramuscularly.

All patients evacuated by air from the Pacific area, and many of those from Alaska, were routed through this base on their way to military hospitals on the eastern seaboard. Patients studied were those classified either as 1-A, needing both sedation and restraint, or as 1-B, needing either sedation or restraint, when airborne. In practice, this hospital routinely sent even 1-B's in a chemically and physically restrained condition.

METHOD

Every other patient to be transported by air was given amobarbital sodium by mouth and the alternates received phenobarbital sodium intramuscularly, in the dosages mentioned. Three patients who would not take amobarbital orally received 0.5 gram of the aqueous preparation intravenously.

Questionnaires were attached to the flight tag of each patient stating (1) name, (2) medication prescribed, and (3) time administered. The flight nurse was asked to describe the sedative effect on the patient during the trip; report the amount, type, and time of any resedation required; sign her name; and return the tag to this base.

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RESULTS

Of the 1,219 questionnaires sent out with sedated patients for whom there were complete medical records, 625 (51.3 per cent) were returned. Of these, 329 pertained to patients who had received amobarbital and 296 to those sedated with phenobarbital. The duration of flight for 460 of the patients was from 8 to 12 hours and for 152 was from 4 to 6 hours. For 14 it was only about 2 hours.

In going over the individual reports, there seemed to be three broad categories into which the responses fell. The effect of medication was such that during the trip the patient presented (1) no nursing problem, (2) some problems, or (3) serious problems. The first group were quiet and co-operative, and were either awake or dozing at intervals. A few slept or were sedated throughout the flight. The second group were restless, talkative, agitated, boisterous, or sullen and withdrawn, but in any case could be reasoned with. The third group presented serious and even dangerous problems, being hallucinated, overactive, assaultive, or suicidal.

As shown in table 1, there was a slight though not statistically significant difference in the response of patients sedated before flight with phenobarbital sodium as compared with those sedated with amobarbital sodium. With phenobarbital, 85.8 per cent were no problem and 11.5 per cent presented minor problems; with amobarbital, the percentages were 90.6 and 7.0, respectively.

TABLE 1. *Percentage of patients presenting nursing problems after sedation with amobarbital sodium (A) or phenobarbital sodium (P), by length of flight*

Response to medication	Length of flight (hours)						Total of all flights		Total combined A or P
	2		4-6		8-12				
	A	P	A	P	A	P	A	P	
No problem	100.0	40.0	91.4	87.9	89.9	86.3	90.6	85.8	88.3
Slight problem	-	40.0	7.5	10.4	7.0	11.1	7.0	11.5	9.1
Serious problem	-	20.0	1.1	1.7	3.1	2.6	2.4	2.7	2.6
Total number	8	5	94	58	227	233	329	296	625

However, most of even this slight difference concerned a class of "minor problem" patients who were merely restless, talkative, or mildly apprehensive and presented only the most minimal psychiatric nursing problem. Actually, the greater percentage of patients who were relatively alert and appropriately responsive

after phenobarbital would be an advantage in the event of ditching on an overwater flight. In such case, the amount of drowsiness present and the degree of reality orientation of patients would be of importance, and phenobarbital did leave a larger percentage of patients alert than did amobarbital (49 per cent versus 33 per cent).

It can be seen from table 1 that, taking both groups together, more than 88 per cent of the patients were no problem whatsoever to the flight nurse, while 9 per cent caused some trouble, and between 2 and 3 per cent presented serious problems in management. The 9 per cent of patients who presented minor nursing problems because of being agitated, apprehensive, or boisterous were the group with which expert handling could produce the most benefit by keeping them from becoming more active, thereby preventing trauma to these restrained patients under the stress of flying.

The 2 to 3 per cent of patients who posed serious nursing problems are presented in more detail in table 2. Out of 625 closed-ward psychiatric patients, only 16 (1 in 39) became an important nursing problem on board an aircraft. Of these, there were 6 (1 in 104) who were assaultive, combative, or suicidal and therefore physically dangerous to themselves or other patients or members of the crew. Each of these 6 patients had a previous history of similar difficulties. None of the small number of patients on 2-hour flights showed this dangerous response, but on 4- to 6-hour flights it was 1 in 152; and on 8- to 12-hour flights, 1 in 92 (5 in 460).

TABLE 2. *Breakdown of serious nursing problem group of patients*

Response to medication	Length of flight (hours)						Total of all flights	
	2		4-6		8-12			
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Hallucinated, overactive	1	7.6	-	-	6	1.3	7	1.1
Resistive, profane	-	-	1	0.7	2	0.4	3	0.5
Assaultive, suicidal	-	-	1	0.7	5	1.1	6	1.0
Number of patients	13		152		460		625	

Resedation was mainly limited to long flights. On those lasting 8 to 12 hours, 39 of 460 patients (1 in 12) were resedated, whereas none of the 13 patients on 2-hour flights received additional sedation and only 4 patients in 152 (1 in 38) on 4- to 6-hour

flights received it. The 17 patients who were resedated in spite of presenting no nursing problem had either complained of headaches or were awake during the long trip and asked for more sedation. The remaining 26 needed it for various psychiatric reasons, 9 being serious management problems and 17 presenting minor nursing problems (table 3).

TABLE 3. *Number of patients resedated*

Nursing problem	4-6 hour flights				8-12 hour flights			
	Amobarbital		Phenobarbital		Amobarbital		Phenobarbital	
	Number	Number resedated	Number	Number resedated	Number	Number resedated	Number	Number resedated
None	86	2	51	1	204	8	201	6
Some	7	-	6	-	16	7	26	10
Serious	1	-	1	1	7	5	6	3
Total	94	2	58	2	227	20	233	19

It appears that on a long flight, if a patient has a history on the flight tag of assaultiveness, resedation should be seriously considered about 3 to 4 hours after the initial medication was given. Flight nurses might properly have little fear of oversedating by the intramuscular route on overactive patients. Resedation can be considered as early as 2 hours after the initial medication is given, especially if the patient is *well-hydrated*. However, it should be borne in mind that *dehydrated* patients may accumulate the intramuscular medication in their tissues without its being picked up by the circulation and having an observable effect until many hours later, when it might be overwhelming in amount.

SUMMARY

No statistically significant difference was observed between the sedative effect of oral amobarbital on 329 airborne psychiatric patients and that of intramuscular phenobarbital on 296 patients.

Of the two groups combined, only 2.6 per cent posed serious management problems and only 1.0 per cent were assaultive or suicidal. The percentage of patients presenting serious nursing problems increased with length of flight.

Resedation should be seriously considered on any long flight for a patient with a history of assaultiveness.

PREVENTIVE DENTISTRY IN THE U. S. AIR FORCE

FRANCIS J. SAMAHA, *Major, USAF (DC)*

THE SIGNIFICANCE of preventive measures in dentistry, as in medicine and industry, cannot be overemphasized.[1] The Air Force dental service is dedicated to the preservation of dental and oral health by the prevention and treatment of dental and oral diseases and injuries among military personnel. For effectiveness, prevention must be foremost in the mission. Inductees are in the age group having the highest rate of dental caries and requiring extensive oral rehabilitation.[2,3] The military, with its organization and records system, affords an excellent opportunity for establishing a closely monitored dental program which permits instruction in oral hygiene and effective follow-through in the maintenance of oral health.

PREVENTIVE DENTISTRY PROGRAM

A plan designed by the dental service of the United States Air Force (Section G, AFM 160-13) was put into effect in October 1952 to supplement the oral rehabilitation services of modern dentistry.[2,4,5] As developed at this Air Force base, the plan includes both education and prophylaxis.

Education

Dental health lectures employing illustrative clinical color slides are presented to all base units annually with the new Air Force training films entitled "Preventive Dentistry" planned for showing. Descriptive literature and personal instructions on proper oral hygiene are given to patients during their oral prophylaxis treatment. New posters developed locally are displayed at intervals in prominent locations throughout the base. The educational material used in this program was developed according to the criteria for acceptability set forth by the American Dental Association,[6] which state that it (1) must be authentic, (2) must meet existing needs, (3) must be effective in promoting dental health, and (4) must be suitable for various age groups and intellectual levels.

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Oral Prophylaxis

One of the primary objectives of the Air Force Preventive Dentistry Program is to accomplish at least one annual oral prophylaxis on all personnel. This in effect means that about 9 per cent of the men at each base must receive oral prophylaxis each month. This is accomplished by the following procedures:

1. All persons appearing on dental sick call who have not had an annual prophylaxis are immediately given an appointment.

2. A review of the A. F. Form 309 (Dental Health Records) is made periodically for more effective control of this annual requirement.

DIAGNOSIS AND TREATMENT

Early diagnosis and treatment are essential elements in a preventive dentistry program. It is important to note that many of those persons who have requested a dental examination have asymptomatic gingival or periodontal disease and/or carious lesions of which they were unaware.

When diagnosis has been established, the dental status of military personnel is determined by the official dental classification system of the Department of Defense. This dental classification system is outlined as follows:

Class 1. Individuals requiring no dental treatment.

Class 2. Individuals requiring routine but not early treatment of such conditions as (a) moderate dental calculus, (b) prosthetic conditions not included in class 4, (c) caries (not extensive or advanced), (d) periodontal diseases (not extensive or advanced), and (e) those requiring corrective or preventive measures.

Class 3. Individuals requiring early treatment of such conditions as (a) extensive or advanced caries, (b) extensive or advanced periodontal diseases, (c) pulpal or apical infection, (d) chronic oral infections, (e) heavy dental calculus, and (f) those requiring removal of one or more teeth or other surgical procedures not included in class 5.

Class 4. Individuals requiring essential prosthetic appliances, including (a) those with insufficient teeth to masticate the service ration, and (b) others in need of an appliance essential to their duty.

Class 5. Individuals requiring emergency dental treatment for such conditions as (a) injuries, and (b) acute oral infections (acute parietal and periapical abscesses, Vincent's infection, acute gingivitis, acute stomatitis, et cetera).

The following factors have been important in the implementation of the Preventive Dentistry Program at this base:

1. An adequate professional staff is of paramount importance. The average staff ratio at this base during 1955 and until June 1956 was 1.9 dental officers per 1,000 military personnel. This compares favorably with the staffing ratio requirement of 2.2 dental officers per 1,000 military personnel.[7]

2. Equally important is the base regulation regarding dental appointments, so that continuity of service can be maintained. By adhering to this regulation, broken appointments have been reduced and the co-operation of base personnel has improved.

3. Continuous surveys are in progress to recognize those patients who are neglecting dental health requirements.

EFFECTS OF PROGRAM

In order to assess the effects of the Preventive Dentistry Program, the dental health status of personnel at this Air Force base for the years 1955 and 1956 were compared with that of the entire Air Force[8] prior to initiation of the program in 1952 (table 1). The figures for Bergstrom in 1952 were not available. Percentages are expressed in terms of the official dental classification system. Before the Preventive Dentistry Program became

TABLE 1. *Comparison of dental health status of U. S. Air Force in 1952, before the oral prophylaxis program, with that of Bergstrom Air Force Base in 1955 and 1956*

Group	Year (calendar)	Accomplished oral prophylaxis per month (% strength)	Per cent strength in dental classes				
			1	2	3	4	5
U. S. Air Force	1952	2.8	34.6	32.9	28.8	2.7	1.0
Bergstrom Air Force Base	1955	8.2	60.9	23.1	13.5	2.5	0.0
	1956 (Jan.-June)	9.3	65.8	19.6	13.5	1.1	0.0

effective, only about a third of Air Force-wide personnel were receiving oral prophylaxis each year. At this base in 1955 and the first half of 1956, all military personnel received at least one oral prophylaxis per year. The indication is that implementation of the program leads to a definite increase in the number of men in class 1 and a corresponding decrease in the number in classes 2 through 5.

To further test the program's effectiveness, a careful screening of the 4,319 base dental health records was accomplished. Of these, 1,456 were eliminated because an annual examination was not recorded. On the basis of the dental classification system, the findings of initial examination in 1,079 men, annual examination in 1,723 men, and discharge examination in 61 men were compared. As noted in table 2, there was a 30 per cent increase in class 1 on annual examination as compared with the initial examination, and an additional increase of 31 per cent on discharge, with a corresponding improvement in the other classes.

TABLE 2. *Dental classification of personnel at Bergstrom Air Force Base on initial, annual, and discharge examinations*

Group examined	Number of cases	Per cent strength in dental class			
		1	2	3	4
Initially	1,079	23	35	40	2
Annually	1,723	53	30	15	2
On discharge	61	84	15	1	0

The two groups—those examined initially and those examined annually—were compared for the incidence of caries, extractions, and periodontal disease. It was found that the annual group averaged 1.1 dental cavities per man, while the group examined initially averaged 2.4 cavities. Despite the fact that there were 644 more men in the annual group than in the initial group, there were 58 fewer cases of periodontal disease and 225 fewer extractions in the annual group than in the initial group.

FLUORIDATION OF DRINKING WATER

Today, fluoridation of drinking water is recognized as an effective advance in preventive dentistry. Its practical worth has been adequately demonstrated.[9] However, despite its impressive benefits it is only one of those weapons to be used against oral diseases. All known preventive measures must be employed as parts of a fully organized program.

Official figures of the United States Public Health Service as of September 1956 show that about 1,400 communities in the United States, with a total population of over 30 million, receive the benefit of fluoridated drinking water.[10] Fluoridation is now providing constant benefit to these millions of citizens through

tremendous reductions in dental caries among children and young adults.

On the basis of pertinent research findings regarding the measure of protection for adult teeth, the Committee on Dentistry of the National Research Council late in 1953 justified fluoridation at military installations.[3] Since that time, the Air Force has made rapid strides in developing policies, criteria, and programs. To date, a total of 25 Air Force bases, including this base, have had plans for fluoridation of their drinking water approved. Thus far, four bases (not including Bergstrom at this writing) have implemented the program.

Since the Government bears heavy expenses in maintaining dental clinics, equipment, supplies, and professional staffs, the cost of dental care is of great concern.[2,3] It has been stated that the "Department of Defense . . . spends about $100 million annually for the dental care of military personnel, and uses the services of nearly 6,000 dentists in the Armed Forces."[11] However, because of the great potential existing in preventive programs, it will be understood why considerable emphasis is placed on the Air Force Preventive Dentistry Program by the Office of The Surgeon General.

The future for preventive dentistry looks bright. Active preventive dentistry and oral research programs should bring new hope for better control of oral diseases through more effective methods of prevention of those conditions that now afflict almost every person.

REFERENCES

1. Ogle, D. C.: Preventive medicine in armed services. *U. S. Armed Forces M. J.* 6: 81-83, Jan. 1955.

2. Elwell, K. R.: Preventive dentistry program; U. S. Air Force plan. *U. S. Armed Forces M. J.* 4: 1463-1467, Oct. 1953.

3. Preventive dentistry. *U. S. Air Force Medical Service Digest* 5: 20-22, Dec. 1954.

4. Preventive dentistry. *Dental News Bulletin.* Office of the Surgeon General, Headquarters U. S. Air Force, Oct. 1952. pp. 5-6.

5. Dental Administration and Technical Procedures. AFM 160-13, Department of the Air Force, Feb. 1955. pp. 61-62.

6. Preventive dentistry. *Dental News Bulletin.* Office of the Surgeon General, Headquarters U. S. Air Force, Feb. 1955. pp. 5-6.

7. Manpower Programming, Medical support. *U. S. Air Force Medical Service Digest* 7: 9, July 1956.

8. Dental health of Air Force. *U. S. Air Force Medical Service Digest* 5: 27-28, Dec. 1954.

9. Dean, H. T.: Dental research and preventive dentistry. *J. New Jersey Dent. Soc.* 27: 21-26, Sept. 1955.

10. U. S. Department of Health, Education, and Welfare: Advance press release, HEW-E10, 28 Oct. 1956. U. S. Department of Health, Education, and Welfare, Public Health Service, Washington, D. C.

11. Lyons, H.: Dimensions of dental health problem. *Oral Hyg.* 46: 718-720, June 1956.

DETERMINING POTABILITY OF WATER SUPPLIES IN THE FIELD

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A RELIABLE method for determining the potability of water supplies in the field is still needed, especially in Alaska where distances between laboratory facilities and the outlying areas are great. The lack of a reliable procedure is felt by both public health officials and military medical department personnel.

Bacteriologic examination of water samples should be accomplished as promptly as possible after collection of the samples, and when a delay is expected the sample should be kept at a low temperature.[1,2] In Alaska, where large numbers of samples are sent by air carriers, long delays are experienced and icing is not practicable. The results of many examinations of shipped water samples have been invalidated by the lapse of time and lack of refrigeration between collection of the sample and its examination.

The exact effects of time and storage temperature on the coliform densities of water appear to be controversial,[3] but there is general agreement that changes are greater in unrefrigerated samples, that they increase with time of holding, and that they usually involve reduction in coliform densities.

The initiation of coliform tests in the field has been advocated by a number of investigators in the past.[3,4-9] In the present study, coliform media were inoculated with water samples in the field and shipped to the laboratory, together with the corresponding water samples, for examination. Evaluation of the results was based on Public Health Service standards.[10] It was believed that this procedure might demonstrate a more reliable means of determining actual sanitary conditions as they existed at the time of sample collection.

EXPERIMENTAL METHODS

In order to see if a reduction in coliforms could be demonstrated in shipped, unrefrigerated water samples, comparisons

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were made between growth in media inoculated in the field and in media inoculated in the laboratory later from the same water sample.

Accordingly, a coliform kit was devised, consisting of 10 six-dram (23 by 88 mm) screw-capped vials for media and a 250-ml, glass-stoppered, sample bottle. Five milliliters of a 3X strength lactose broth were placed in five vials, and 5 ml of a 3X strength lauryl tryptose broth were put into the other five vials. The two media were used to see if one would be more efficient for detecting coliform organisms. For chlorinated waters, a small amount of sodium thiosulfate was added to the sample bottles. Media and sample bottles were sterilized by standard methods.[1] Vials were calibrated with a scratch mark at the 15-ml level to facilitate the addition of 10 ml of the sample to the 5 ml of media. The vials were placed in one mailing carton and the sample bottle in another.

An instruction and data sheet was enclosed in each kit with the request that the sample be taken a short time prior to shipping. During cold weather, especially if freezing was likely, a note was added requesting that the inoculated vials be left overnight in a warm room to encourage bacterial growth before shipping. Upon receipt in the laboratory, vials of media showing adequate growth were subjected to the confirmatory test. Those vials which were clear or showed slight turbidity were incubated at 35° to 37°C overnight; if no growth was then evident they were discarded as negative. The remaining portion of the water sample, which was returned unrefrigerated with the vials, was examined by the standard laboratory test, using lactose broth.

Over a period of approximately three years, a total of 207 coliform kits were sent or taken into the field, and 169 were returned. Samples were received in the laboratory during all months of the year except March and May, most of them being shipped during the summer and fall.

The area covered in the sampling included the northern and western Alaskan coasts, St. Lawrence Island, lower Kuskokwim River (southwestern), and the interior and south central regions. Approximately 65 per cent of the samples were from surface supplies.

The inoculation of the media vials in the field was usually accomplished within an hour after collection of the sample. The interval of time between the collection and the laboratory examination of the shipped water samples varied from 6 hours to 10 days, with one interval of 14 days. The average time was 4.3 days. Ninety-six (56.8 per cent) of the samples showed an

elapsed time of more than 3 days before they were examined in the laboratory.

The evaluation of differences was based on the numbers of samples, vials, or tubes which were found to be positive for coliform bacteria. Significant findings were indicated where there were completely negative results on the one hand and positives on the other. No attempt was made to show differences in terms of Most Probable Numbers (MPN).

RESULTS AND DISCUSSION

Of the 169 samples examined, 96 (56.8 per cent) were positive for coliform bacteria. Samples positive and negative for coliform bacteria by the two procedures are shown in table 1.

TABLE 1. *Results of field and laboratory procedures*

Samples		Results of procedures	
Number	Per cent	Field	Laboratory
73	43.2	−	−
68	40.2	+	+
27	16.0	+	−
1	0.6	−	+

The most noteworthy point in this table is indicated by the 27 samples (16.0 per cent) which were positive by the field procedure but negative by the standard laboratory procedure. According to the latter test, these water samples would have been classified as potable, when actually they were not. There had been either a complete die-off of coliform organisms, or a reduction in numbers to the extent that they could not be detected in the shipped samples by the laboratory technic employed. By contrast, the field procedure failed to show these organisms in only one sample (0.6 per cent) in which the laboratory procedure demonstrated their presence.

A comparison of the productivity of the two media inoculated in parallel in the field showed that differences were, for the most part, not significant. Of 95 samples positive for coliform bacteria, 94 (98.9 per cent) were positive in lactose broth, while 89 (93.7 per cent) were positive in lauryl tryptose broth. However, the total number of confirmed lauryl tryptose broth vials exceeded those of the lactose broth by approximately 3.3 per cent.

The increased effectiveness of the procedure is dependent upon the initiation of coliform growth soon after collection of the sample. These organisms are capable of growing over a wide range of temperature, *viz.*, 5° to 45°C, although there is some selectivity as to types which will grow at the extreme temperatures. The effects of non-coliform overgrowth and antagonism would be less likely where coliform organisms have had a chance to develop before shipment. Furthermore, these effects could be lessened by using a selective medium such as lauryl tryptose broth.

By using five 10-ml portions of water per sample, an estimation of coliform density can be obtained. Under the usual conditions of testing in the field, a high degree of accuracy in enumeration is difficult to achieve.

SUMMARY AND CONCLUSIONS

A simple and effective procedure for determining the potability of water supplies in the field is described. The inoculation of media in the field is a feasible procedure. It is applicable to the bacteriological examination of turbid waters such as often found in samples from surface supplies in rural Alaska. This procedure is believed to be especially adapted to those areas where an inordinate amount of time is required for the samples to reach the laboratory after collection. Furthermore, this method gave considerably fewer false negative results than the standard test when performed on shipped, unrefrigerated water samples.

ACKNOWLEDGMENT: The author is grateful to Mrs. Clarissa Allen and Mrs. Dorothea Swan for technical laboratory assistance.

REFERENCES

1. American Public Health Association, American Water Works Association, and Federation of Sewage & Industrial Wastes Association: *Standard Methods for the Examination of Water, Sewage, and Industrial Wastes.* 10th edition. American Public Health Association, New York, N. Y., 1955. p. 372.

2. Ministry of Health (British): *The Bacteriological Examination of Water Supplies.* Reports on Public Health and Medical Subjects No. 71 (revised edition). His Majesty's Stationery Office, London, 1939. (Reprinted 1952). p. 37.

3. Geldreich, E. E.; Kabler, P. W.; Jeter, H. L.; and Clark, H. F.: Delayed incubation membrane filter test for coliform bacteria in water. *Am. J. Pub. Health* 45: 1462-1474, Nov. 1955.

4. McCrady, M. H.: Mailing-case method for long-distance bacteriological control of water supplies. *J. Am. Water Works A.* 7: 845-851, Nov. 1920.

5. Caldwell, E. L., and Parr, L. W.: Present status of handling water samples; comparison of bacteriological analyses under varying temperature and holding conditions with special reference to direct method. *Am. J. Pub. Health* 23: 467-472, May 1933.

6. Weiss, J. E., and Hunter, C. A.: Simplified bacteriological examination of water. *J. Am. Water Works A.* 31: 707-713, Apr. 1939.

7. Stuart, R. D.: Transport problems in public health bacteriology; use of transport media and other devices to maintain viability of bacteria in specimens. *Canad. J. Pub. Health* 47: 114-122, Mar. 1956.

8. Mallmann, W. L.; Dahljelm, I.; McCurdy, H.; Broitman, S.; and Kereluk, K.: Field test for determining the sanitary quality of rural water supplies. Proceedings of the 56th General Meeting of the Society of American Bacteriologists, Apr. 29-May 3, 1956. *Bact. Proc.*, 1956. p. 104.

9. Hope, M. C., and Neill, A. H.: Use of membrane filter technique for testing water supplies in field. *Pub. Health Rep.* 71: 1093-1096, Nov. 1956.

10. U. S. Public Health Service: Public Health Service drinking water standards, 1946. *Pub. Health Rep.* 61: 371-384, Mar. 15, 1946.

KNOW YOUR INDUSTRIAL SOLVENTS

The use of the so-called industrial solvents is no longer confined to a plant or factory. In various forms they are utilized in the home, in the garden, and on the farm. Rarely are they harmful if handled judiciously. A physician should be able to advise his patient what the preventive measures (careful handling) are. He should likewise recognize the ear marks of any given intoxication if and when it occurs. His treatment should be based upon his knowledge of the expected physiologic and pathologic reaction. The physiologic classification of these solvents is therefore very important.

—RUTHERFORD T. JOHNSTONE, M. D.
in *Illinois Medical Journal*
pp. 301-302, Nov. 1954

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ATTITUDES AND MOTIVATIONS OF TEST PILOTS

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AS THE demands on both pilot and aircraft become greater, more attention is being directed to the human factors involved.[1-3] Most of the work in this area has been primarily concerned with physiologic and psychologic stress upon the pilot resulting from extreme speed and altitude. Design of aircraft utilizing sound human engineering principles has also been emphasized. Both of these areas are extremely important, and the findings to date have added to the safety and comfort of aircrew members as well as to their increased efficiency. However, an important area of scientific study which has been given only passing attention is the attitudes and motivations of the pilots who are expected to fly these new supersonic aircraft. Of particular interest in this study are the attitudes and motivations of test pilots. In aircraft as yet unproven, these men are called upon continually to expose themselves to the unknowns of high altitude supersonic flight. As Flickinger has stated, "It is through their [test pilots] courage and skill in performing their daily jobs that we derive the information that leads to better aircraft and the growth of stronger national air power."[4]

When asked what makes a good test pilot and what motives are involved, the picture of the carefree youth who jumps at the chance to gamble with death immediately comes to the mind of most people. The test pilot is conceived by many as portrayed by the Hollywood film industry, the Sunday paper supplements, and nationally known magazines.

Those actually concerned with the selection of test pilots are not so confident that they know the motives or the qualities of a good test pilot. The panel discussion referred to above touched on the problem briefly. As the members were themselves test pilots, the discussion began by considering the criteria for selection of a test pilot. The discussants agreed this was an important and controversial question, but they had no clear

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answer. The "desire to fly" and "successful tactical experience" were listed as important attributes, but beyond this no specific characteristics were given. It seems that in most cases the process of selection is a natural one in which those individuals with the requisite flying background, motivation, and technical knowledge gravitate toward test-flight duty.

THE PROBLEM

The present research does not propose to answer the question posed by the panel moderator as to what makes a good test pilot, but hopes to present data which will perhaps give us a better understanding of the modern test pilot's feelings and suggest areas for further research. Perhaps as we become better aware of the attitudes and motivations of our present test pilots and more familiar with the job requirements, it will be possible to screen out from the applicants for test-pilot school those whose attitudes and motives are not consistent with those considered to be important. Also, as the true nature of the modern test pilot's duties and attitudes become more widely known, not only will a more accurate picture be presented to the general public but perhaps some who "always thought" they wanted to be test pilots will reconsider. One pilot interviewed stated this very clearly, indicating that if he had been better informed as to the true nature of test flying he would never have applied for test-pilot school.

METHOD

As this study was exploratory in nature, an extensive and intensive approach to the problem was not undertaken. The technics used were (1) an unstructured open-ended interview of 12 pilots assigned to the Flight Test Operation Division of this base and (2) a questionnaire which was given to all available pilots assigned to Flight Test Operations. The 12 pilots interviewed were selected from a list of all pilots; and because the person making the choice did not know any of the pilots, an unbiased selection was possible. The range of test-flight experience was from a few months to about three years. The group interviewed included both fighter and cargo-bomber pilots. Though small in size, this sample appeared to be a representative cross section of the pilots at this base. The pilots talked freely and frankly during the 90-minute interview. Complete anonymity was assured each pilot.

The questionnaire was given to the 21 pilots available at the time of the study. All questionnaires were completed. The questions pertinent to this paper were as follows:

1. Below are some reasons given by others as being important as to why they are test pilots. We would like you to rank these as to importance in your case. Place a 1 before the factor you feel is most important; a 2 before the second most important item; a 3 before the third, and so on. Remember to rank them in terms of what is important to you. Your responses will be confidential so please be frank.

———diversified flying (all types or particular types)

———pay (including flight pay)

———prestige–recognition

———rank (chance of promotion)

———thrill (the danger involved)

———desire to conquer and explore unknown areas

———consider it a good stepping stone to a civilian job

———get out of previous unpleasant assignment

2. List three factors which you feel would have better qualified you for your present assignment.

3. Below is a scale indicating possible attitudes toward your assignment as a test pilot. Please place a check above the number that best describes your present feelings toward your assignment as a test pilot.

1	2	3	4	5
Very satisfied enthusiastic about present assignment	Satisfied but not enthusiastic	Indifferent to present assignment no strong feelings either way	Dislike present assignment but do not plan to request change	Strongly dislike present assignment would change if possible

4. Do you feel you are (*more* or *less*—circle appropriate word) satisfied with your assignment than the average Air Force Officer?

5. Do you plan to be a test pilot two years from today? Yes——— No———

RESULTS

The questionnaire results will be presented first and then amplified by the information obtained in the interview. The reasons for being a test pilot in question 1 were placed in the following order as to importance:

1. Diversified flying (all types or particular types)
2. Desire to explore and conquer unknown areas
3. Prestige–recognition
4. A good stepping stone to a civilian job

5. **Thrill** (the danger involved)
6. **Rank** (chance of a promotion)
7. **Pay** (including flight pay)
8. Get out of previous unpleasant assignment

Diversified flying was easily the most important reason for being a test pilot. Desire to conquer and explore unknown areas was given as the second most important factor, and prestige–recognition was third. Figure 1 presents the quantified score in graph form for each factor. The score was obtained by giving each 1 response a weight of 8, each 2 response a weight of 7, each 3 response a weight of 6, et cetera. Figure 1 indicates that the first three factors are clearly the most important reasons why these pilots requested test flying. The belief that the thrill and the danger involved are an important motive for becoming a test pilot is not supported by these results. Thrill is fifth in importance; no pilot checked it as either first or second in importance, and only two pilots rated it as third.

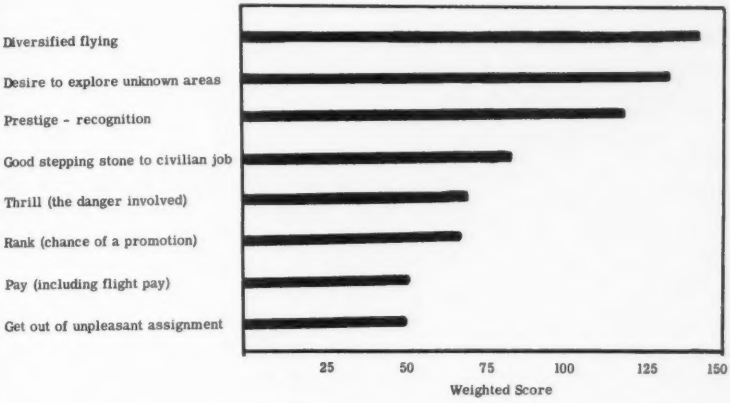

Figure 1. Motivation of test pilots.

On question 2 relating to prior experience, 18 of the 21 pilots completing the questionnaire stated that they believed more technical information and more formal schooling, especially in engineering, would have made them better qualified for test flying. Thirteen of the 21 thought that more diversified flying experience would have better qualified them for their present assignments. No other area approached this degree of unanimity.

Seventeen of the 21 pilots stated that they were highly satisfied and enthusiastic about their present assignment, 2 were satisfied, 1 was indifferent, and 1 disliked his assignment. All

but two believed they were more satisfied with their assignment than the average Air Force officer, and all but one said they planned to be test pilots two years from today.

These results indicate that as a group test pilots are highly satisfied with their present duties and plan to continue being test pilots as long as possible.

INTERVIEW FINDINGS AND DISCUSSION

The results of the interview strongly support the questionnaire finding that the persons in this group were highly satisfied with their duty as test pilots. The love of flying and the chance to fly different types of aircraft were found to be the primary motives, and a feeling of accomplishment and of making a significant contribution to the Air Force a close second. Many thought that in peacetime this was the only assignment that offered a challenge and a feeling of self-satisfaction. Prestige and recognition, as in the questionnaire, was about third in importance, but interestingly the majority of those interviewed considered that this recognition often came from sources outside the Air Force. Also, since desire for diversified flying is such a strong motivating force for becoming a test pilot, any curtailment of this opportunity might result in some feelings of disappointment, and could contribute to lowered morale.

From this limited sample it appears that there is no one type of personality or socioeducational background that is characteristic of most test pilots. As in other occupations, test flying meets different personality needs for each individual. However, the common conception of test pilots as carefree, happy-go-lucky, devil-may-care individuals applies only to a very small minority. A few such types seem to be present, but they will probably become less numerous as the true scientific nature of the work becomes more widely known. The test pilots studied at this base are cautious, careful individuals, whose approach to their task is similar to research workers in other areas. They conceived their mission as one of gathering reliable and accurate information, and their behavior in the air and on the ground seems to be guided by this over-all goal. The almost unanimous desire for more technical education supports this conception. Perhaps it would not be amiss to refer to them as research pilots rather than test pilots.

Of particular interest in these interviews were the pilots' attitudes toward the dangers involved in supersonic flying of relatively unproven aircraft. None denied the existence of these dangers, but all thought they would be able to anticipate and prevent mishaps. Of major importance here was their self-con-

fidence and their feeling that they knew their aircraft well. The long hours spent studying mock-ups and in briefings before actually flying the aircraft seem to greatly reduce the fears of the unknown. A few admitted this overconfidence in their ability might cause them to stay with the plane too long, but each believed he would be able to make the correct decision. Another factor which may cause the pilot to stay with the plane beyond the safe ejection point is the feeling of unreality. Because of their many hours of flying when they have always been able to "bring it back" and their extreme confidence in their own ability, the feeling that this "couldn't be happening to me" may delay the decision to eject beyond the critical point. Few believed they could eject at high speeds and survive, and all thought this factor also might cause them to stay a little longer in an endeavor to control the aircraft. All hoped for improvements in the technic of high-speed ejection, most believing that "high speed ejection is something you have to live with today."

FUTURE ASSIGNMENTS

Assignment after completing his tour at this base is something no test pilot anticipates with any eagerness. Most test pilots seem to consider that this is the top assignment of their career and that any other will be anticlimactic. The type of assignment given them after completing their present tour was often mentioned as the crucial factor as to whether or not they would remain in the Air Force. It seems it is at this point that the lure of civilian test flying may become most attractive.

Two suggestions were offered to prevent this loss of highly skilled personnel to the Air Force. Those with engineering training considered that the logical progression was (1) to project officer and then (2) to a weapons-system project officer. Pilots who wanted to return to tactical operations suggested that they follow an aircraft through the test program and then into the field. They thought that they would then be in an excellent position to utilize the experience and knowledge gained during testing. All test pilots felt that the individual pilot should be consulted before any future assignments were made.

SUMMARY

To study the attitudes and motivations of test pilots assigned to Flight Test Operations at this base, 12 pilots were interviewed and 21 completed an attitude-motivation questionnaire. Results indicated that pilots become test pilots primarily because they love to fly, and because they feel they are accomplishing something worthwhile. Prestige and recognition are also important factors, but most test pilots believe this comes pri-

marily from sources outside the Air Force. Technical information, engineering training, and diversified flying experience are listed as important prerequisites. The modern test pilot's approach to his work seems to be similar to that of research workers in other areas, and the happy carefree, devil-may-care individual seems to be the rare exception rather than the general rule. The term "research pilot" is suggested as a more descriptive term than "test pilot." As a group, test pilots are highly confident of their flying ability. This self-confidence and thorough knowledge of their duties seem to be important factors in overcoming the fear of the danger involved. For this sample of pilots, the dangers and unknowns of supersonic flight did not appear to pose a problem. Exploring these unknowns is an important motivating force. Most test pilots consider that this type of flight duty is the top Air Force assignment of their career and that any future assignment will be anticlimactic.

REFERENCES

1. Dempsey, C. A.; Greiner, T. H.; Burch, N. R.; Chiles, D.; and Steel, J.: Human factors in long range flight. *J. Aviation Med.* 27: 18-22, Feb. 1956.

2. Flickinger, D.: Crew effectiveness in the B-52 strategic bomber; planning by human factors teams. *J. Aviation Med.* 26: 2-12, Feb. 1955.

3. Gogge, A. P.: Human factors in aircraft design. *Air Surgeons Bull.* 2: 298, 1945.

4. Flickinger, D. (moderator): Sky unlimited: panel discussion on extreme speed and altitude. *J. Aviation Med.* 26: 503-512, Dec. 1955.

RESEARCH MONEY

"A sharp increase in the volume of medical research and in the funds available for its support have been major developments of the past 10 years. Total national expenditures have increased from 75 million dollars in 1945 to about 240 million dollars in 1955. Each of the major contributors—philanthropy, endowment, industry, and government—increased its total contribution. This is important, because diversity in source of support for research is vitally important. However, the increases have not been proportionate. At the present time government supports about half the medical research in this country and industry about a third. Funds from endowment and philanthropy have not increased at a rapid rate."

—JAMES A. SHANNON, M. D.
in *Journal of American Medical Association*
p. 1030, Mar. 24, 1956

Coarctation of the Aorta

With Resistance to Blackout From Acceleration Forces

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ALAN L. HASLUP, *Lieutenant, MC, USNR*
RUFUS J. PEARSON, Jr., *Captain, MC, USN*

THE DIAGNOSIS of coarctation of the aorta has become so commonplace in large hospitals that a report of a single additional case requires more than the inherent interest in the disease to justify its publication. An aviator with an unusual feature of coarctation was seen recently at this hospital. While giving his history to a physician, the patient stated that he had consistently had an increased resistance to blacking out during flight maneuvers involving acceleration forces ordinarily considered sufficient to produce blackout. A relationship between this resistance and the coarctation warrants consideration of the possible mechanisms.

CASE REPORT

A 23-year-old Marine Corps aviator, who had been retired because he had coarctation of the aorta, was admitted to this hospital on 13 August 1956 for surgical correction of the coarctation. The past history revealed that in October 1953, when he received a physical examination for appointment to a commissioned grade, a cardiac consultation had been obtained because of cardiac murmurs. Apparently the murmurs were considered not disqualifying because he was accepted for active duty. An electrocardiogram of 2 November 1953 had been reported as within normal limits. On 28 May 1954 a physical examination at a naval air station revealed a loud systolic murmur over the pulmonic valve and a soft diastolic murmur to the left of the sternum. Hypertension of moderate degree had been noted on several occasions in the 1953-1955 period.

There were no symptoms referable to the cardiovascular system except for tingling in the legs when the patient was nervous and precordial heaving of several months' duration. Throughout his training and career as a Marine Corps aviator, he had had an unusual resistance

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to the blacking-out effect of acceleration. The patient claimed that at no time during his flight training did he experience blacking out or graying out (loss of peripheral vision). In 1954, while training with AD-1 fighter bombers, he made 192 practice bombing runs entailing 40° glide-bombing runs and 60° dive-bombing runs. During none of these did he grayout or blackout. He stated that, at one time or another during the practice bombing runs, every man in his squadron except himself had experienced some degree of the retinal dysfunctions associated with high acceleration. He noted that during the runs he had been subjected to from 4.5 to 6.5 G. He recalled specifically that in 1955, during a dive-bombing run from 10,000 feet, he found himself in a dive with excess power and, finding that his altitude was decreasing and his air speed increasing too rapidly, he pulled out of the dive abruptly. During the pullout he noted that his accelerometer reached 7 G and that he actually passed the wing man who had been flying ahead of him in column formation. He grounded the aircraft for structual check after this experience, in which, again, he had had no blackout or recognized grayout.

Physical examination revealed a well-developed, well-nourished young white man who appeared healthy. The radial pulses were strong and the carotids were forceful. The femoral pulses were present but weak, and lagged behind the radials. The abdominal aortic pulse was diminished. Dorsalis pedis pulses were present but weak. The blood pressure was 140/69 mm Hg in the right arm and 140/60 mm Hg in the left arm in the supine position with simultaneous readings. The upper-extremity flush point was 110. The blood pressure in the left leg was 130/90 mm Hg and in the right leg, 120/100 mm Hg. The lower-extremity flush point was 90. There were no visible or palpable collateral arteries. The heart was essentially normal in size on percussion. A grade III, systolic, harsh, blowing murmur was heard best in the third left intercostal space near the sternum, but was transmitted to the precordium, neck, and back and was easily heard down the spine. A grade II, diastolic, blowing murmur was heard best in the fourth left intercostal space. The electrocardiogram was within normal limits. Fluoroscopy revealed slight enlargement of the left ventricle. A double indentation of the esophagus was seen with barium swallow. A roentgenogram showed minimal notching of the ribs. Operation revealed a coarctation with a 4-mm opening.

DISCUSSION

That the occurrence of resistance to the effects of acceleration and the presence of coarctation of the aorta in this patient is more than coincidental is strongly suggested by the observations of Wood[1] and his associates at the Mayo Aero Medical Laboratory. They described a patient with coarctation of the aorta who showed a remarkable resistance to the effects of positive acceleration when tested in the human centrifuge.

The physics and experimental physiology of the retinal and cerebral ischemia which produces blackout and unconsciousness have been clearly presented by Wood and associates[2] and will only be touched on here. In the interest of orientation, a simplified diagram (fig. 1) is used to show the relationships between the heart, brain, and retinas and the effect of acceleration in causing blackout and unconsciousness.

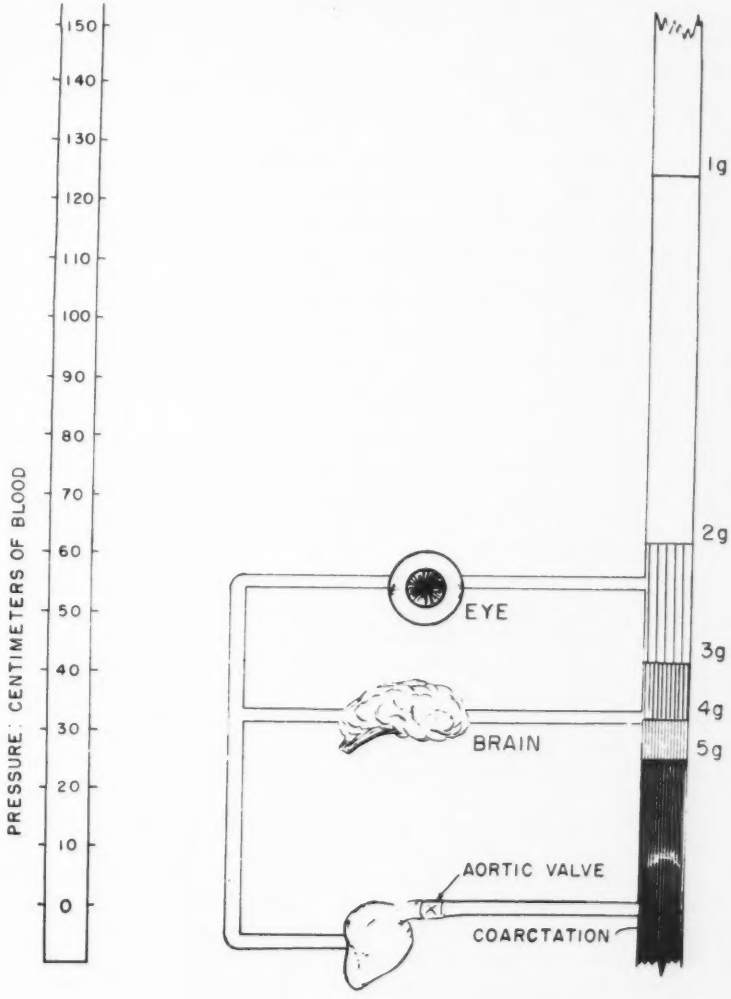

Figure 1. Levels of blood at various accelerations supported by fixed pressure at heart level.

In the diagram, the heart is represented as a pump operating at a constant pressure during the initial period of acceleration. This postulate has been experimentally demonstrated in centrifuge studies.[2] Circulation to the head is shown as a column of blood with outflows at cerebral and retinal levels. The dimensions in the figure are derived from the assumption that the mean blood pressure at the level of the heart is 95 mm Hg, which is equivalent to 125 cm of blood. The retina is indicated above the level of the brain to represent the intraocular tension of some 20 mm Hg, or 26 cm of blood, which must be overcome by the perfusing pressure. It is obvious that, under normal conditions, the height of blood in the column is more than adequate to perfuse both the retinas and the brain.

With the onset of acceleration, each cubic centimeter of blood in the column increases in weight in direct proportion to the acceleration applied. It has already been established that, with the onset of acceleration and for a definite interval thereafter, the supporting pressure at the base of the column, *i. e.*, the blood pressure at heart level, is constant. Further, under ordinary conditions there would appear to be no obstruction to the immediate fall of the column, which would occur as the weight of the column (and therefore its pressure at heart level) rose above the normal supporting pressure in the aorta at heart level. The distance the top of the column falls from its normal position is directly proportional to G, so long as the blood pressure at the heart level is constant. For increasing values of applied G forces, the column of blood falls proportionately from its initial level, as indicated in the figure.

It becomes plain in the figure that blackout must (as it does) occur before unconsciousness, when acceleration increases. It is also evident that the height of the column of blood at any value of G is a function of the blood pressure at the heart level, so that rising blood pressure at heart level proportionally raises the height of the column at any value of G. This relationship is the crux of the problem of resistance to blackout, whether induced by an anti-G suit or by coarctation of the aorta.

In coarctation, the protective mechanisms might be ascribed to the frequent presence of hypertension above the level of the coarctation; to an unusually early and active response of the compensatory mechanisms which take place in acceleration;[2] or to the obstruction placed in a major pathway of retreat for the falling blood column under the influence of acceleration (fig. 1). The mechanism in this case is speculative, and even in a case of coarctation studied in the centrifuge, the available data do not clearly indicate the precise protective mechanism.[1]

SUMMARY

An aviator with coarctation of the aorta seen recently at this hospital had increased resistance to the blacking-out effect of acceleration. We have been able to find only one other report in the literature of this feature of coarctation. It is postulated that this resistance might be ascribed to the hypertension which exists above the level of coarctation.

REFERENCES

1. Wood, E. H.: Personal communication.
2. Wood, E. H.; Lambert, E. H.; Baldes, E. J.; and Code, C. F.: Effects of acceleration in relation to aviation. *Federation Proc.* 5: 327-344, Sept. 1946.

Every doctor has a set of fairly firm beliefs as to which illnesses are acceptable and which are not; how much pain, suffering, fears, and deprivations a patient should tolerate, and when he has the right to ask for help or relief; how much nuisance the patient is allowed to make of himself, and to whom; etc., etc. These beliefs are hardly ever stated explicitly but are nevertheless very strong. They compel the doctor to do his best to convert all his patients to accept his own standards and to be ill and to get well according to them.

—MICHAEL BALINT, M. D.
in *Lancet*
p. 684, Apr. 2, 1955

Anterior Pituitary Insufficiency and Diabetes Mellitus

CHARLES B. MOORE, *Lieutenant, MC, USNR*

DIABETES mellitus in the presence of hyperfunction of the anterior pituitary has been fairly frequently reported, but I have been able to find in the literature only 14 authentic cases of the concurrence of diabetes mellitus and spontaneous anterior pituitary insufficiency. This article presents the fifteenth recorded case of such a combination.

Although the incidence of the combination is not known, the reported cases indicate that the diagnosis is being made with increasing frequency because (1) more tests are available to assay endocrine function properly, and (2) more physicians now recognize the symptoms produced by anterior pituitary insufficiency. Thus, of the previously reported cases of this syndrome, six[1-5] appeared prior to 1950 and eight[6-11] since then. Autopsies were performed on the 11 patients who died, usually soon after onset of anterior pituitary insufficiency. Of the surviving three, one is reportedly doing well,[9] one is receiving maintenance therapy and reportedly not doing well,[5] and one is reported to be living without replacement therapy.[11]

Early diagnosis is essential and should be considered in any diabetic patient who suddenly requires less insulin or in whom insulin sensitivity develops. With proper replacement therapy and cautious medical care, the patient may be returned to some form of productive life.

CASE REPORT

A 33-year-old white woman was admitted to this hospital on 17 March 1952 because of diarrhea and drowsiness of five days' duration and some recent vomiting.

In November 1937, following a severe emotional upset, malaise, polydipsia, polyphagia, and loss of weight developed. Shortly after this a diagnosis of diabetes mellitus was made. The diabetes was well regulated in a hospital on a daily dosage of 20 units of protamine

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zinc insulin and 8 units of regular insulin. This dosage controlled the diabetes for several years. The patient was admitted to the same hospital on 14 October 1940 with clinical manifestations of a urinary infection and moderately severe diabetic acidosis, both of which were successfully treated, and when the patient was discharged 11 days later, the diabetes was well regulated on a daily dose of 30 units of protamine zinc insulin.

On 9 July 1941, the patient was admitted to the same hospital with diagnoses of controlled diabetes mellitus, pregnancy of 35 weeks' duration, and early toxemia of pregnancy. The blood pressure was 130/95 mm Hg. Mild edema of the ankles was present. Slight improvement followed care in the hospital and the patient was discharged. Two days later she was readmitted because of increasing albuminuria and edema. On 25 July, because of diabetes mellitus and toxemia, a cesarean section was performed. Profuse bleeding occurred because the placenta was in the line of the incision. Despite a transfusion of 500 ml of whole blood during the operation, the patient remained hypotensive for several days. Four days following cesarean section shock developed, the blood pressure remaining around 70/40 mm Hg for several hours. Response to intravenous infusion of dextrose and saline solutions was slow. The patient was discharged on 8 August; the diabetes was well regulated on 28 units of protamine zinc insulin daily.

During the next few years the patient began to note a gradual decrease in the amount of insulin required, and increasing difficulty in maintaining stable control of the diabetes. By April 1944 the insulin requirement had decreased to 6 units of protamine zinc insulin daily, and the patient ate freely except for mild carbohydrate restriction. Sometime during 1944 she also noted menstrual irregularity for the first time. Prior to this, she had menstruated regularly since her pregnancy. Between 1944 and the spring of 1952 she had occasional scanty menstrual periods, after which her menses ceased completely.

Following severe mumps in 1948 the patient's health gradually but continually became worse. During the next few years the insulin requirement remained about the same (4 to 6 units of protamine zinc insulin daily) (fig. 1). The patient had no further bouts of diabetic acidosis. Two weeks prior to admission to this hospital she had experienced a severe infection of the upper respiratory tract.

At the time of admission in April 1952 the diabetes required 5 units of protamine zinc insulin daily, but the patient had taken none for the preceding five days, allegedly because of the diarrhea. Physical examination upon admission revealed a thin, pale, dehydrated white woman appearing chronically ill. Her blood pressure was 106/80 mm Hg; pulse rate, 74/min; respiration, 18/min; and temperature, 97°F. She weighed 93 pounds and was 5 feet 3 inches tall. Initial laboratory

tests revealed a blood sugar of 102 mg/100 ml, glycosuria, a leukocyte count of 3,900/μl, and an erythrocyte count of 3,600,000/μl.

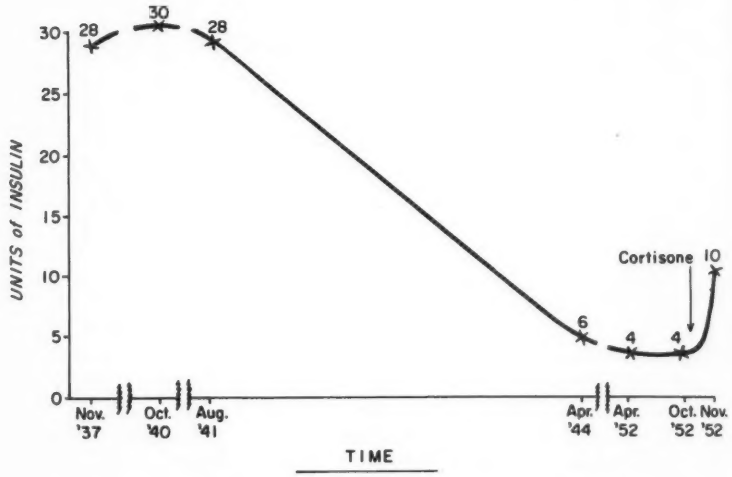

Figure 1. Diagrammatic representation of insulin requirement of patient over a period of 15 years.

The patient was given 10 units of protamine zinc insulin upon admission. The same evening she became extremely pale, cold, and nauseated. She complained of difficulty in breathing and of a heaviness substernally. A few moments later she vomited 500 ml of gastric contents and complained of profound weakness. She continued to be cold and dry. An electrocardiogram was reported as suggesting electrolyte imbalance. Serum chloride was 73 mEq/l. Blood sugar was 52 mg/100 ml. The patient responded only slightly to an intravenous infusion of dextrose in water, and Darrow's solution hypodermically.

The next morning she became nauseated, and at noon profound insulin shock suddenly developed. This was followed by two generalized convulsions. During the next few days she gradually responded to supportive treatment, but continued to be nauseated and ate little. Gastric intubation was necessary to maintain nutrition, and after hydration, anemia became apparent and required many blood transfusions.

A few days later another hypoglycemic reaction followed injection of 15 units of regular insulin, which was given just before intravenous infusion of 1,000 ml of a 5 per cent solution of dextrose. When the infusion was started, the blood sugar was 292 mg/100 ml, and four hours later it was 46 mg/100 ml. The diarrhea improved rapidly with symptomatic therapy.

Ten days after admission, physical and roentgenographic evidence of right middle and lower lobe pneumonia developed. The pneumonia rapidly resolved following treatment with penicillin, and the patient was discharged on a dosage of 4 units of protamine zinc insulin daily, to be followed in the outpatient clinic. A roentgenogram of the chest at this time revealed only slight residual infiltration in the right middle lobe.

During the next few months the patient continued to have a poor appetite, lost 22 pounds, was weak, and had periodic bouts of nausea and vomiting. Moderate anemia, demonstrated at this time, failed to respond to the usual antianemic measures. In addition to loss of pubic and axillary hair, the patient complained of loss of libido, cold intolerance, and amenorrhea. These complaints, coupled with insulin sensitivity, suggested a diagnosis of anterior pituitary insufficiency.

The basal metabolic rate was reported to be in the hypothyroid range, although the exact values are not available. An I^{131} tracer study revealed an uptake by the thyroid gland in 48 hours of 4.8 per cent of the administered dose. Following a dose of 20 units of thyroid-stimulating hormone daily for three days, I^{131} was again administered on the fourth day. The 48-hour uptake by the thyroid gland then was 12.7 per cent of the administered dose.

The patient was therefore readmitted to this hospital on 6 October 1952 with a diagnosis of anterior pituitary insufficiency and diabetes mellitus. Physical examination revealed an undernourished, cachectic white woman whose temperature was 98.6°F; pulse rate, 86/min; and blood pressure, 86/68 mm Hg. Generalized wasting of the muscular and subcutaneous tissue was apparent. The hair on the head was dry and sparse, and the axillary and pubic hair was considerably decreased. There was thinning of the lateral part of the eyebrows. The left pupil was smaller than the right and reacted sluggishly to light and accommodation. The tongue was slick. The breasts were atrophied. The skin was dry and had lost its normal turgor. The serum chloride was 95.8 mEq/l; serum sodium, 133 mEq/l; serum potassium, 4.4 mEq/l; red blood cell count, 4,200,000/μl; hemoglobin, 12.5 g/100 ml; hematocrit, 38 ml/100 ml; leukocyte count, 4,850/μl, with 2 per cent band forms, 42 per cent segmented polymorphonuclear leukocytes, 46 per cent lymphocytes, 5 per cent monocytes, and 5 per cent eosinophils. Serologic test for syphilis was negative. Results of urinalysis were normal. The fasting blood sugar on admission was 72 mg/100 ml, but it varied between 63 mg/100 ml and 350 mg/100 ml while the patient was in the hospital. On 9 October the urinary neutral 17-ketosteroids were 0.9 mg/24 hours. The patient was given 25 mg of corticotropin (ACTH) every six hours for three days, and on the third day the urinary 17-ketosteroids were 2.6 mg/24 hours. On the following day they were 2.6 mg/24 hours. Following administration of 25 mg of ACTH the total

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circulating eosinophils fell, in four hours, from 122/μl to 88/μl. Roentgenograms of the skull showed no abnormality.

While in the hospital the patient was given a 2,115-calorie diabetic diet and 6 units of isophane insulin (NPH insulin) daily. Following several episodes of hypoglycemic shock on this dosage, the amount was reduced to 4 units daily. A routine electrocardiogram taken on 30 October was interpreted as showing S-T segment changes compatible with an anterior septal myocardial infarction. Four days prior to this the patient had had an episode of vomiting and vague transient epigastric pain.

Six days prior to discharge the patient was given 12.5 mg of cortisone by mouth twice daily. Rapid improvement resulted, and the insulin requirement gradually increased, so that by the time she was discharged she was taking 10 units of NPH insulin daily, and showing intermittent glycosuria. She was discharged on 5 November with instructions to take 25 mg of cortisone and 10 units of NPH insulin daily, to be followed in the outpatient clinic.

Five days later, the patient was admitted to the hospital for the last time. In the 24 hours preceding this admission she had experienced several bouts of syncope. Immediately prior to admission she had had two successive generalized convulsions followed by vomiting. Upon admission she appeared extremely pale and acutely ill. Examination was limited to the head and neck. No blood pressure could be obtained. On 11 November 1952, the patient died. Laboratory studies performed after her death revealed: blood sugar, 516 mg/100 ml; CO_2, 14 mEq/l; and serum chloride, 89.6 mEq/l.

Autopsy

Gross examination. The breasts were small. The pituitary gland weighed 250 mg (normal weight, about 600 mg). Its size was slightly decreased, and its consistency was not normal. The region of the anterior lobe of the pituitary revealed what appeared to be absence of the usual rounded surface, which was replaced by flat, thickened fibrous tissue.

The heart was normal in size and shape. In the tip of the interventricular septum anteriorly were several areas of ecchymosis. The coronary arteries showed severe atheromatosis with almost complete occlusion in the first centimeter of both the right and left coronary arteries. This partial occlusion continued throughout most of the length of the coronaries. The ostium of the right coronary artery was narrowed considerably by atheromatous areas on the aorta. The first three centimeters of the ascending aorta showed yellow atheromatous plaques. The adrenal glands were considerably decreased in size but retained their normal shape. The right adrenal weighed 3.1 grams and the left adrenal weighed 4.0 grams (normal, 5 to 6 grams). The adrenal

cortex measured 1 mm in thickness. The thyroid gland was small but otherwise appeared to be normal.

Microscopic examination. There were small areas of lymphocytic infiltration in the epicardium, and one area contained a large raised hyaline plaque. The endocardium appeared normal. Most of the interstitial connective tissue of the myocardium was loosely arranged, and the cardiac muscle fibers were widely separated. In the section through the interventricular septum (fig. 2) there were areas where the cytoplasm of the muscle cells was swollen and deeply stained and the nuclei were large and pale. Scattered throughout the myocardium were areas showing various degrees of cardiac muscle cell degeneration.

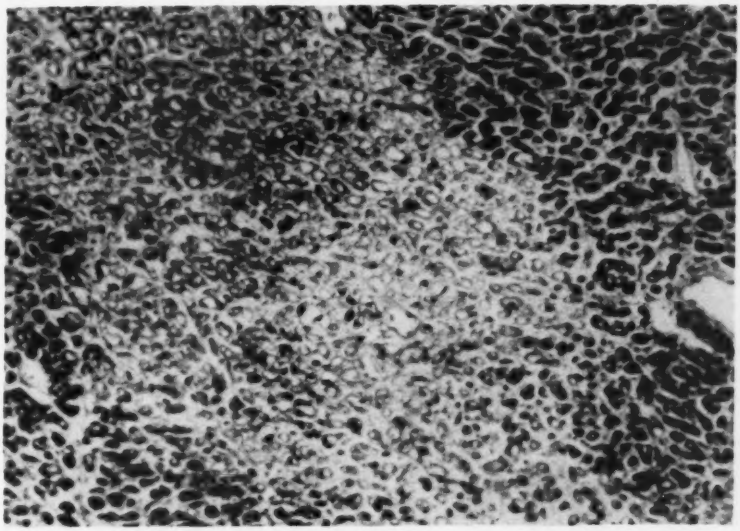

Figure 2. Photomicrograph showing area of myocardial necrosis. (× 100)

The adrenal capsule was thick and hyalinized, and composed at least one third of the gland. In some areas fingerlike processes of fibrous tissue dipped into the cortex, and in some areas reached the medulla. The zona glomerulosa appeared normal. The zona fasciculata was greatly decreased in size, although the cells that remained appeared normal (fig. 3). There was moderate fibrosis of the zona reticularis, which was also greatly decreased in size. The medulla of the adrenal appeared normal.

In the pituitary the parenchyma had been replaced by dense hyalinized scar tissue except for a small area about the periphery of the gland adjacent to the posterior lobe. In this area there were small groups of parenchymal cells (fig. 4). There was a large recent hemorrhage into the anterior lobe posteriorly. The posterior lobe of the

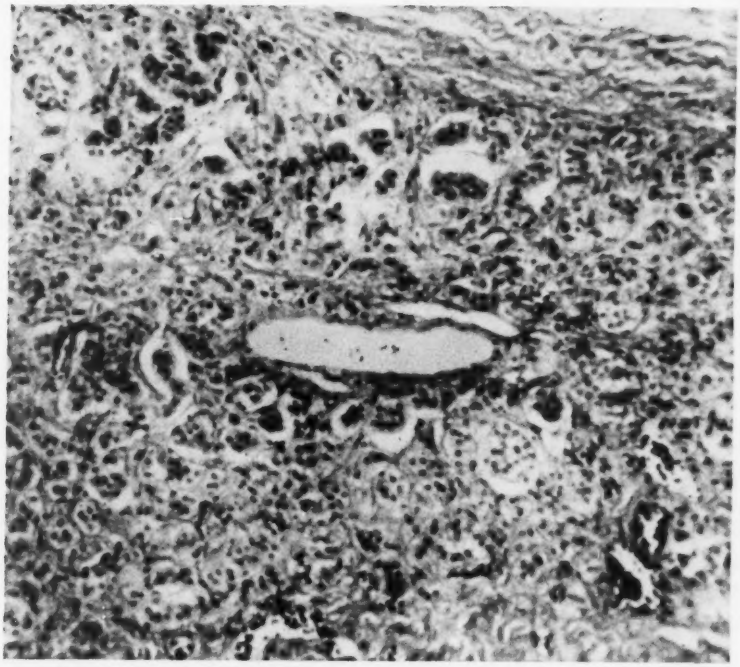

Figure 3. Photomicrograph showing severe atrophy of zona fasciculata and zona reticularis of adrenal cortex. (× 100)

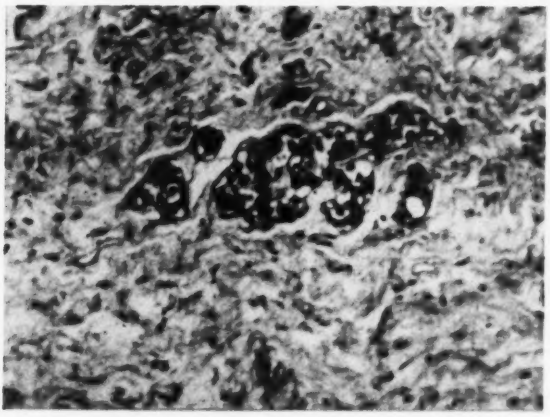

Figure 4. Photomicrograph showing pituitary replaced by fibrous tissue except for a few parenchymal cells in the center. (× 100)

pituitary appeared normal. The lobules of the breasts were small and widely separated by relatively acellular hyalinized connective tissue, which stained deeply with eosin. The endometrium of the uterus was thin and lined by low cuboidal cells. The glands showed little evidence of secretory activity. The thyroid follicles were small and lined by low cuboidal cells (fig. 5). The lumina of most contained pink staining colloid which varied from dark to light pink. The interstitial tissue was dense, and a large portion was hyalinized. There was diffuse lymphocytic infiltration as well as lymph node formation within the stroma. Mitotic figures were frequently seen in the germinal centers of the lymphatic nodules. In the ovary the germinal epithelium was composed of the usual low cuboidal cells. In the dense stroma there were a very few growing follicles. Several graafian follicles were present. The pancreas appeared normal.

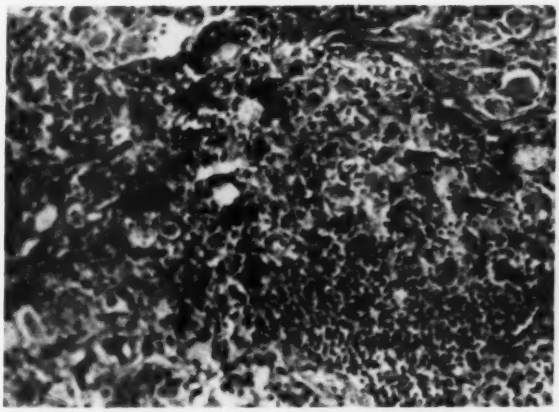

Figure 5. Photomicrograph of a section of the thyroid showing small follicles and dense hyalinized interstitial tissue. (× 100)

DISCUSSION

In a recent review of the literature on the Houssay phenomenon, Harvey and de Klerk[11] summarized the 11 previously reported cases and added three of their own. As in patients with anterior pituitary insufficiency without diabetes mellitus, the clinical picture tends to vary from patient to patient, depending upon the particular target gland whose function is most greatly reduced. This syndrome has occurred with equal frequency in males and females. In females the most common cause is postpartum pituitary necrosis. Other causes include sarcoidosis, pituitary tumors, infections, and arteriosclerosis. In only one half of the reported cases had the diagnosis been made with certainty before death.

Among the more common symptoms attributed to anterior pituitary insufficiency, according to Sheehan and Summers,[12] are loss of libido, amenorrhea, cold sensitivity, weakness and lethargy, mental lassitude, loss of pubic and axillary hair, loss of eyebrows, systolic hypotension, and pallor.

Certain fairly characteristic pathologic changes result from insufficiency of the anterior pituitary gland. Primary among these are the atrophic changes in the endocrine system, particularly in the adrenals, thyroid, gonads, and secondary sex organs.

As in patients with diabetes mellitus without anterior pituitary insufficiency, the pancreas may appear normal or it may show hyalinized islets of Langerhans.

The diagnosis of this syndrome should be suspected from the history and results of physical examination, but certain tests of endocrine function may help in confirming it. Among these are the thyroid tests (basal metabolic rate, I^{131} uptake study, serum cholesterol, protein-bound iodine, and thyroid-stimulating hormone test), the adrenal cortical tests (urinary 17-ketosteroids, corticoids, the Kepler water test, and the ACTH test), pituitary-gonadal test (urinary gonadotropins), and tests of carbohydrate tolerance (glucose tolerance and insulin tolerance test). Of these, the thyroid-stimulating hormone test and the ACTH test may be particularly helpful in distinguishing primary hypothyroidism and hypoadrenalism from the secondary type due to absence of the pituitary hormones. The insulin tolerance test is particularly dangerous in patients who have anterior pituitary insufficiency, and probably should not be performed.[13]

The constant threat to life seems to come from acute adrenal insufficiency or from hypoglycemic reactions; the latter occurs particularly in those patients who still require small amounts of insulin to control the diabetes mellitus.

In the case herein reported the clinical picture was similar to that noted in previously reported cases. The patient had had diabetes mellitus for 15 years prior to death, and apparently survived 11 years after infarction of the anterior pituitary in 1941. The symptoms, physical findings, and results of laboratory examinations were all compatible with the diagnoses of anterior pituitary insufficiency and diabetes mellitus. It is difficult to be certain about the final episode. The patient had impending diabetic acidosis, had had a myocardial infarction 11 days before, and most likely had acute adrenal insufficiency in addition.

SUMMARY

A case is presented of a patient with known diabetes mellitus who suffered postpartum hemorrhage with infarction of the ante-

rior pituitary, followed by gradually decreasing requirements for insulin over a period of years, and eventually by bouts of hypoglycemic reactions to small amounts of insulin. The insulin requirement increased following cortisone therapy. Her death would appear to be related more closely to diabetes mellitus and arteriosclerotic heart disease than to pituitary insufficiency. The diagnosis was confirmed at autopsy.

REFERENCES

1. Bálo, J.: Uber Nekrosen des Hypophysenvorderlappens und ihre Folgen. *Beitr. z. path. Anat. u. z. allg. Path.* 72: 599-602, 1923-1924.

2. Lyall, A., and Innes, J. A.: Diabetes mellitus and pituitary gland; case of diabetes with intercurrent pituitary lesion and concomitant improvement of diabetes. *Lancet* 1: 318-321, Feb. 9, 1935.

3. Kotte, J. H., and Vonderahe, A. R.: Houssay phenomenon in man; report of case of diabetes mellitus, infarct of anterior lobe of pituitary body and terminal hypoglycemia. *J. A. M. A.* 114: 950-953, Mar. 16, 1940.

4. Feldman, F.; Roberts, J. B.; Susselman, S.; and Lipetz, B.: Coincidence of diabetes mellitus and hypopituitarism. *Arch. Int. Med.* 79: 322-332, Mar. 1947.

5. Vandenbroeck, J., and Ferin, J. R.: L'influence de l'insuffisance hypophysaire sur le cours du diabete pancreatique. Une observation humaine. Les effects de la gonadotrophine serique d'origine equine chez la femme. *Ann. d'endocrinol.* 8: 366-369, 1947.

6. Matzullo, E. R., and Handelsman, M. B.: Pituitary necrosis and diabetes mellitus. *J. Clin. Endocrinol.* 11: 537-547, May 1951.

7. Williams, F. W.: Pituitary necrosis in diabetic during pregnancy; Houssay phenomenon in man. *Diabetes* 1: 37-40, Jan.-Feb. 1952.

8. Israel, S. L., and Conston, A. S.: Unrecognized pituitary necrosis (Sheehan's syndrome); cause of sudden death. *J. A. M. A.* 148: 189-193, Jan. 19, 1952.

9. Poulsen, J. E.: Houssay phenomenon in man; recovery from retinopathy in case of diabetes with Simmonds' disease. *Diabetes* 2: 7-12, Jan.-Feb. 1953.

10. Rothfeld, B., and Rodas, J. M.: Diabetes and panhypopituitarism. *Ann. Int. Med.* 41: 140-146, July 1954.

11. Harvey, J. C., and de Klerk, J.: Houssay phenomenon in man. *Am. J. Med.* 19: 327-336, Sept. 1955.

12. Sheehan, H. L., and Summers, V. K.: Syndrome of hypopituitarism. *Quart. J. Med.* 18: 319-378, Oct. 1949.

13. Perkins, R. F., and Rynearson, E. H.: Endocrine review; practical aspects of insufficiency of anterior pituitary gland in adult. *J. Clin. Endocrinol.* 12: 574-603, May 1952.

Fatal Anaphylactic Reaction to Lidocaine

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ANAPHYLACTIC reactions, although not new, are a constant threat to any patient receiving a medicinal agent. Thousands of new drugs are being introduced, each of which has the potential capability of sensitization and subsequent anaphylaxis. A reaction of this nature produces a medical emergency that is hardly equaled. In many cases the survival of the patient hinges on immediate recognition and vigorous treatment. There is little reason to conclude that the number of anaphylactic reactions will decrease. Therefore the physician and dentist must be prepared to treat these reactions and must know their early signs and symptoms.

The employment of lidocaine hydrochloride as a local anesthetic has been associated with few uptoward reactions. Most of those that have occurred were not fatal, and no prior report can be found of any death or serious reaction attributed to lidocaine anaphylaxis.

CASE REPORT

A 20-year-old man was given approximately 0.8 ml of 2 per cent Xylocaine (brand of lidocaine) with epinephrine 1:50,000 in preparation for an operative dental procedure. About 45 seconds after the injection he was asked because of his paleness if he felt faint, but before he could answer he became unconscious, his breathing became irregular, and he went into convulsions, which were transient. At this point artificial respiration was started. The patient was deeply cyanotic and except for an occasional gasp appeared to be dead. A medical officer who happened to be in the building gave caffeine with sodium benzoate to the patient, but no change occurred and he was pronounced dead.

On two other occasions during the preceding two weeks the patient had been given injections of Xylocaine with epinephrine from the same lot that was used on the day of his death. The previous injections did not produce toxic symptoms.

No topical anesthetic solution was used on any of the three occasions. Tincture of Merthiolate (brand of thimerosal) was used as an

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antiseptic solution but no premedication was employed. This patient had previously stated on a printed questionnaire that he had had a reaction to sulfa drugs, but had not indicated an allergy to any other drugs.

Autopsy. Examination at autopsy revealed that the patient had been a normally developed, well-nourished, young adult, weighing an estimated 150 pounds. There was mild cyanosis of the nail beds and mucous membranes.

The heart weighed 275 grams. In the immediate subepicardial layer, a few petechial hemorrhages were seen, most frequently over the dependent surfaces. Except for petechiae noted at infrequent intervals through sections, the myocardium was normal. The cardiac chambers, valves, and coronary arteries appeared normal. Each lung weighed 525 grams and had a rather boggy consistency. Several petechiae were noted on the pleural surfaces. The tracheobronchial tree was normal. The pulmonary vessels were clear. The spleen weighed 275 grams and the liver, 1,900 grams. Marked oozing of blood occurred from the rather distended hepatic venous channels. The gastro-intestinal tract and adrenal glands were normal in appearance. Cut sections of the kidneys revealed markedly congested cortical and medullary areas.

The cerebral convolutions were flattened, due apparently to mild cerebral edema. Other than this flattening there was no indication of increased intracranial pressure. Closely spaced coronal sections throughout the cerebrum, the brain stem, and the cerebellum revealed no specific abnormalities other than marked congestion of the meningeal and intracerebral vessels.

DISCUSSION

Lidocaine is a tertiary amine with the chemical name of α-diethylamino-2,6-acetoxylidide hydrochloride. It may be used in infiltration, block, low caudal, topical, continuous caudal, peridural, and spinal (subarachnoid) anesthesia.[1] According to laboratory data[2] its advantages are that it (1) is the most stable anesthetic agent known and may be stored almost indefinitely or vigorously heated in the presence of strong alkali or acid without appreciably decreasing its potency, (2) has an unusually short latency period, (3) has wide clinical usefulness and is adaptable to all types of conduction anesthesia, (4) has rapid diffusion properties, (5) has a relatively low toxicity, and (6) produces profound anesthesia.

Although reported side reactions have not been fatal, the drug is capable of producing serious toxic reactions when used in excess of 500 mg. The total dose for an adult[3] should not exceed 300 to 350 mg when using the 0.5 per cent concentration. This amount gives excellent results. A 1.5 per cent concentration is

not necessary even for a regional block. The 0.5 per cent solution has the same toxicity as a 0.5 per cent procaine solution, but with increased concentration the toxicity exceeds that of procaine. A 1 per cent concentration has about a 40 per cent greater toxicity than procaine, and a 2 per cent concentration has a 50 per cent greater toxicity.

At the present time lidocaine is available in concentrations that are higher than those shown to be entirely satisfactory. This drug should be used in less volume and less concentration because its diffusion characteristic affords a greater area of block, per unit, than any other local anesthetic.

Methemoglobinemia has been seen in conjunction with the use of lidocaine.[4] The patient was given 90 mg of pentobarbital sodium 30 minutes before the administration of 15 ml of a 2 per cent lidocaine solution with epinephrine 1:50,000. A full-mouth extraction was accomplished, and no abnormal reaction was noted. About 12 hours later the patient suddenly became dizzy and lost consciousness. Seven milliliters of 1 per cent methylene blue was given intravenously, and one and one-half hours later the patient had recovered and appeared normal. Further recovery was uneventful. Inasmuch as lidocaine is a derivative of acetanalide, which is a drug known to produce methemoglobinemia, the lidocaine was named as the causative agent. The patient denied taking any drugs other than those administered by the dentist.

In contrast to procaine, lidocaine seems to produce a depression rather than a stimulation of the central nervous system as an initial effect. It is distributed by the body in the fatty tissues[5] in the same manner as a general anesthetic. It is then much more slowly metabolized than procaine.

The ideal conduction anesthetic agent[6] should combine quick action, low toxicity on both localized nerve and general systemic (central nervous system) structures, lengthy duration, complete interruption of painful sensation, ready diffusibility, stability in solution, and potency after sterilization. Powell and Nowill,[6] in comparing lidocaine with procaine, did 166 regional procedures with lidocaine. General systemic toxic reactions were revealed in four of their patients who had definite generalized convulsions. A common reaction appeared to be mild drowsiness and, in the above-mentioned four patients, this was the first abnormal sign. Due to an error in technic, one patient had 2 to 3 ml of 2 per cent lidocaine with epinephrine administered intravenously. This patient first showed mild drowsiness, then a few mild facial twitchings, cyanosis of the nail beds and mucous membranes, and a gradual increase in somnolence but no unconsciousness. The reaction, however, stopped spontaneously before any other

abnormalities were seen, and the only treatment given was oxygen inhalation. A second patient had convulsions beginning 30 minutes after a brachial plexus nerve block, and required Pentothal (brand of thiopental sodium) and oxygen. On regaining consciousness, somnolence and headache were present for several hours. Another patient developed convulsions following an intercostal nerve block with 30 ml of 1 per cent lidocaine and required Pentothal and oxygen resuscitation. A repeat intercostal nerve block with lidocaine at a later date produced the same effect but in a much milder and more transient form; no specific treatment was required. A fourth convulsive-type reaction of mild nature occurred following a brachial plexus block. A hypertensive reaction occurred in several patients, apparently caused by the epinephrine.

Powell and Nowill recommended that the following equipment should be available for treatment of patients having reactions to lidocaine: face mask with a breathing bag, source of oxygen, a short-acting barbiturate, vasopressor drugs, appropriate syringes and needles, endotracheal tube, and laryngoscope.

The treatment of anaphylactic reactions is similar, even when they are caused by different agents. Epinephrine and hydrocortisone[7] have been used intravenously with good results. Epinephrine is employed to relieve the severe bronchiolar spasm seen in many of these patients.

SUMMARY

Toxic reactions to lidocaine hydrochloride are few, considering the large amounts that are used; but fatal as well as less severe reactions to this drug are possible.

A healthy, 20-year-old man had an immediate fatal anaphylactic reaction from 0.8 ml of a 2 per cent solution of Xylocaine (brand of lidocaine) used as a local anesthetic in preparation for a dental procedure. The only pertinent findings at autopsy were subepicardial and myocardial petechial hemorrhages, mild cerebral edema, and marked congestion of the meningeal and intracerebral vessels.

It is believed that this is the first reported instance of a death attributed to lidocaine anaphylaxis.

REFERENCES

1. *New and Nonofficial Remedies, 1956.* J. B. Lippincott Co., Philadelphia, Pa., 1956. pp. 40-42.

2. Löfgren, N.: *Studies on Local Anesthetics.* Ivan Haeggstrom, Stockholm, Sweden, 1948.

3. Sadove, M. S.: Latest developments in anesthetic agents. *M. Times* 83: 291-292, Mar. 1955.

4. Deas, T. C.: Severe methemoglobinemia following dental extraction under lidocaine anesthesia. *Anesthesiology* 17: 204, Jan. 1956.

5. Sung, C. Y., and Truant, A. P.: Physiological disposition of lidocaine and its comparison in some respects with procaine. *J. Pharmacol. & Exper. Therap.* 112: 432-443, Dec. 1954.

6. Powell, W. E., and Nowill, W. K.: Clinical evaluation of xylocaine as regional anesthetic agent. *Anesth. & Analg.* 32: 350-355, Sept.-Oct. 1953.

7. Morrisset, L. M.: Penicillin anaphylaxis; case report. *Texas J. Med.* 51: 77-78, Feb. 1955.

LEAD POISONING IN CHILDREN

The diagnosis of lead poisoning should be considered in all cases in which children who have a pica for paint complain of constipation, abdominal pain, and vomiting. It should be given first consideration in cases in which children have an isolated convulsion that is not associated with fever or other physical signs. In such instances, a simple test for porphyrinuria will indicate the possibility of lead poisoning. If porphyrin is present in the urine, the blood should be searched for basophilic stippling, and a roentgenogram of the long bones should be made in order to determine whether or not a lead line is present. An abnormal quantity of lead in the blood or urine will confirm the diagnosis.

—HEYWORTH N. SANFORD, M. D.
in *Postgraduate Medicine*
p. 167, Feb. 1955

Delayed Obstruction After First-Stage Repair of Omphalocele

JAMES B. ANDERSON, *Major, USAF (MC)*
RICHARD P. GOTCHEL, *Captain, USAF (MC)*

OMPHALOCELE is a rare lesion arising from an arrested reduction of the physiologic herniation of abdominal viscera which occurs and subsides during the sixth to the ninth week of gestation.[1] When the sac contains intestines alone, the incidence is one in 5,000 births, but when the sac also contains herniated liver, the incidence decreases to one in 10,000 births.[2] Between 1 October 1952 and 30 September 1955, there were three infants with omphalocele in 3,391 births at this hospital. This is considerably greater than the expected incidence.

PURPOSE

This article reports the unusual complication of obstruction occurring three months after a first-stage repair, and contrasts the mortality of the two surgical approaches in management of large omphaloceles.

In a recent study of acute small bowel obstruction, omphalocele accounted for only 0.5 per cent of the cases in all age groups and for only 5 per cent of obstructions due to anomalies.[3] Although obstruction at the umbilical defect in association with omphalocele at birth has been reported,[4] late obstruction due to a narrowing defect following a first-stage repair is not common.[3,4] While it seems that such obstructions would be frequent, undoubtedly some of them are incomplete or subside unrecognized; consequently, attention is directed to the problem presented in case 1.

Despite one notable exception,[5] principles of management have not been sufficiently disseminated during the past five years. The need for wider and more current dissemination is illustrated by (a) the presentation at a recent surgical conference of a case of primary repair in an infant whose large herniation was forcibly reduced with fatal outcome, and (b) the management of an infant, born in October 1952 at this hospital, by difficult reduction

From U. S. Air Force Hospital, Bolling Air Force Base, Washington 25, D. C.

of a large omphalocele and primary abdominal repair which resulted promptly in respiratory failure and death.

CASE REPORTS

Case 1. A male infant was born on 16 October 1954 with a 10-cm omphalocele. Within four hours, skin flaps had been mobilized under local infiltration and closed longitudinally over the intact sac. Under compression with plastic sponge and Ace bandage, the mass became progressively more reducible.

At three months of age, the child was readmitted because of vomiting and intermittent protrusions on each side of the upper aspect of his abdominal scar. He had refused his last feeding, but distention was equivocal. A barium enema (fig. 1) showed incomplete rotation but filling of the cecum to a point subjacent to the subcutaneous protrusions, moderate distention of small bowel, and a translucency of the protrusions suggestive of fluid only. Despite nasogastric suction,

Figure 1 (case 1). Barium enema roentgenogram made during second admission, prior to second-stage repair.

findings of complete obstruction progressed. Surgical exploration disclosed edematous but viable cecum and terminal ileum irreducibly prolapsed through a 3-cm fascial defect; proximally the ileum was distended (fig. 2). Incisions relaxing the fascia permitted reduction and closure in layers after excision of excess tissue. Convalescence was uneventful, and the child has remained well (fig. 3).

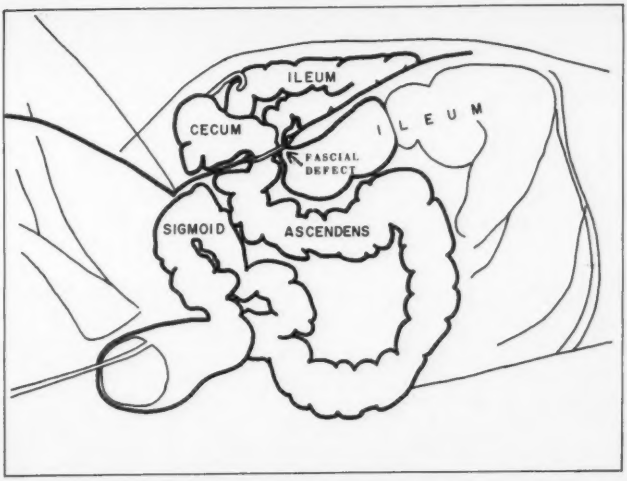

Figure 2 (case 1). Composite line drawing of preoperative findings on barium enema roentgenogram and the position of the bowel as found at operation. Note the cecum and terminal ileum, herniated through the fascial defect, that cannot be seen clearly on the barium enema roentgenogram in figure 1.

Figure 3 (case 1). Postoperative appearance at 18 months of age, over one year after emergency second-stage repair.

Case 2. A female infant was born on 20 December 1954 with a 15-cm omphalocele; within three hours, skin flaps had been mobilized and closed transversely over the intact sac under local infiltration; her fascial defect was 12 by 15 centimeters. Postoperative dyspnea was relieved by oxygen and regurgitation reduced by elevation of head and shoulders. On her fifth day, significant vomiting was investigated by instilling lipiodol through a nasogastric tube; in three hours, despite distention, the lipiodol had progressed into the rectum. Smaller, more frequent, and dilute feedings were retained and supplemented by clysis. She was discharged on her 23d hospital day. Figure 4 shows the patient

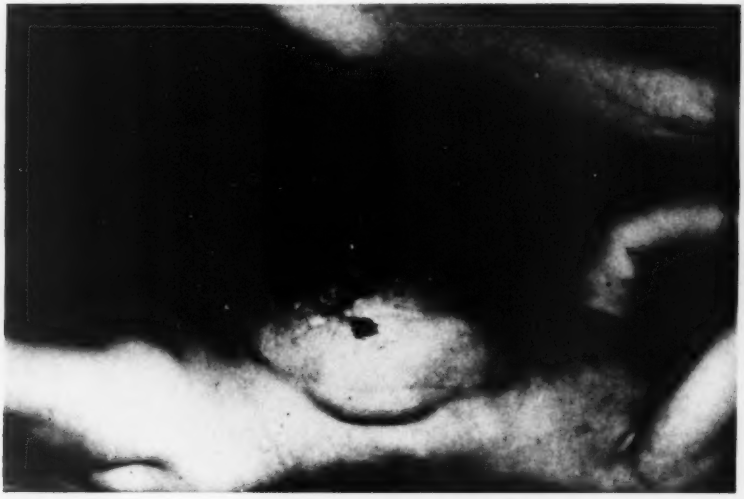

Figure 4 (case 2). Postoperative appearance three months after first-stage repair.

three months after the first-stage repair. She progressed satisfactorily through her 14th month when the family moved. It was estimated that another three to six months would be necessary to safely permit reduction and primary closure.

DISCUSSION

The omphalocele sac is composed of only two thin, avascular layers, extracelomic peritoneum and amniotic membrane, measuring less than 1 mm in thickness.[6] The fascial defect ordinarily measures from 3 to 5 cm and bears no constant relationship to the size of the sac, which may be large enough to contain all abdominal viscera.[5] Inasmuch as the friability of the sac is progressive, rupture and evisceration must be considered imminent. Previously, evisceration had been catastrophic; today, however, expeditious operation, antibiotics, and good nursing can now salvage about one third of infants whose sacs

rupture. It is mandatory, therefore, to follow Dott's dictum that the infant should pass "from the womb to the operating table."[7]

Treatment of large omphaloceles by reduction and primary closure in a series of 88 cases at the Boston Children's Hospital entailed a formidable mortality, namely, 25 per cent in infants with sacs measuring less than 7 cm, 70 per cent in newborns with sacs between 7 and 9 cm, and 85 per cent in those with sacs larger than 9 centimeters.[5]

Staged management was originated and first reported by Gross and Blodgett[8] in 1940. Gross'[9] modification, whereby the sac was not excised prior to covering with skin flaps, was reported in 1948. In contrast to the formidable mortality in primary closure, life expectancy in infants with large but otherwise viable omphaloceles treated by staged management at the Boston Children's Hospital was vastly improved. Although obstruction arising from malrotation or from less frequent causes has occasionally necessitated subsequent operation, such theoretical complications as infection, cyst formation, sloughing of skin flaps, epidermal inclusions, and obstruction due to adhesions have failed to materialize.[5] Malrotation is present in about one third and may give rise to obstruction requiring surgical relief at the time of the first-stage repair or subsequently.[5,10] Nearly two thirds of these infants have other anomalies which may be either inconsequential irregularities or serious cardiorespiratory, urogenital, or gastrointestinal defects.

SUMMARY AND CONCLUSIONS

Three newborn infants with large omphaloceles were treated at this hospital during the past three years; two by staged management with gratifying results and the other by difficult closure with a dismaying fatal outcome. The unusual complication of delayed obstruction due to a narrowing fascial defect that required emergency second-stage repair when the patient was three months old is reported.

Large omphaloceles must be approached promptly by staged management. To attempt primary closure by forcibly reducing herniated viscera into an inadequate compartment is to invite disaster; prompt relaxing incisions may avert this outcome whenever primary repair results in respiratory failure.[10]

Covering the sac by skin flaps is a relatively simple procedure when done under local anesthesia; correction of other serious anomalies may require general anesthesia.

Vomiting at any time postoperatively should be investigated forthwith to confirm or rule out intestinal obstruction.

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Enlargement of a small fascial defect at the time of the first-stage procedure may preclude subsequent obstruction caused by progressive closure of the umbilical ring.

REFERENCES

1. Patten, B. M.: Body cavities and mesenteries. In Patten, B. M.: *Human Embryology.* The Blakiston Co., Philadelphia, Pa., 1946. p. 561.

2. Anderson, N. A.: Diseases of newborn infant. In Nelson, W. E. (editor): *Mitchell-Nelson Textbook of Pediatrics.* 4th edition. W. B. Saunders Co., Philadelphia, Pa., 1945. p. 253.

3. Bollinger, J. A., and Fowler, E. F.: Results of treatment of acute small bowel obstruction; clinical study of 205 consecutive cases. *A. M. A. Arch. Surg.* 66: 888-904, June 1953.

4. Byran, T. B. L.: Case of exomphalos complicated by acute intestinal obstruction. *Brit. M. J.* 2: 818-819, Dec. 23, 1944.

5. Gross, R. E.: Omphalocele. In Gross, R. E.: *The Surgery of Infancy and Childhood.* W. B. Saunders Co., Philadelphia, Pa., 1953. pp. 406-422.

6. Jason, A. H.: Congenital eventration at umbilicus. *Surgery* 16: 950, Dec. 1944.

7. Dott, N. M.: Clinical record of case of exomphalos illustrating embryonic type and its surgical treatment. *Tr. Edinburgh Obst. Soc.* pp. 105-108, 1931-1932; in *Edinburgh M. J.* Aug. 1932.

8. Gross, R. E., and Blodgett, J. B.: Omphalocele (umbilical eventration) in newly born. *Surg., Gynec. & Obst.* 71: 520-527, Oct. 1940.

9. Gross, R. E.: New method for surgical treatment of large omphaloceles. *Surgery* 24: 277-292, Aug. 1948.

10. Kahle, H. R.: Omphaloceles; analysis of 21 cases from Charity Hospital of Louisiana at New Orleans. *Am. Surgeon* 17: 947-958, Oct. 1951.

A MESSAGE FROM THE A. M. A.

A medical news publication recently carried an item concerning a Department of Justice report of a record sum settlement in a malpractice case involving the United States. It was stated that the suit, in which an ex-servicewoman won a $210,000 court judgment for disability resulting from continuous caudal anesthesia administered in a military hospital, was settled for $175,000.

Medical professional liability is one of the most frequently discussed and most important subjects of interest to military and civilian physicians today. In December 1954, the Board of Trustees of the American Medical Association requested the A. M. A. Law Department to plan and initiate a comprehensive study of medical professional liability. For the past two years, the Law Department has been conducting an exhaustive survey of this subject. It has collected facts, figures, and opinions on medical professional liability. This material has been studied and analyzed, and is now in the process of being made available to the medical profession.

In planning this study, it was decided that the following projects should be undertaken: (1) an analysis of state insurance laws and regulations, (2) a review of state statutes of limitation, (3) an analysis of reported cases, (4) an analysis of professional liability claims involving physicians in Government service, (5) a survey and analysis of pertinent state legislation, (6) a survey of state medical societies, (7) a survey of national medical societies, and (8) a sample survey of 5 per cent of the physician members of the A. M. A.

In addition to these projects, various topics were selected for articles to be included in a special series on the subject of professional liability. The topics to be covered are: (1) The History of Professional Liability Claims in the United States; (2) "Put It in Writing, Doctor"; (3) Medical-Legal Hazards of Anesthesia; (4) Physicians Expressing Opinions as to Former Treatment; (5) The Res Ipsa Loquitur Case; (6) The Rule of Respondeat Superior; (7) Hazardous Therapy; (8) New Concepts in Professional Liability Suits; (9) Professional Liability Claims

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense. —*Editor*

Prevention; (10) Professional Liability Insurance Coverage; (11) Professional Liability Claims in England; and (12) The Law of Professional Liability.

Professional liability claims involving military or federally employed physicians are usually instituted pursuant to the provisions of the Federal Tort Claims Act. Military personnel are precluded from recovery from the United States for malpractice under this law. However, they may proceed against the physician and a judgment, if rendered, would be against him personally. Military dependents usually proceed against the United States under the Federal Tort Claims Act in military malpractice cases.

Generally speaking, the legal principles governing medical professional liability of civilian practitioners are equally applicable to military and federally employed physicians, with only minor exceptions. The military physician is personally responsible for negligence that results in injury to his patient in the same manner and to the same extent as if he were in private practice, with one exception: If the injured person elects to proceed against the United States under the Federal Tort Claims Act and recovers a judgment against the United States, the physician is relieved from pecuniary liability.

It is to be noted that under this Act there is no monetary limitation in the amount obtainable in a malpractice suit against the United States. However, since administrative settlement of these claims is limited by the terms of the Act to amounts not in excess of $1,000, it is readily apparent that few administrative settlements are made for personal injury alleged to have resulted from malpractice.

Since Government physicians, whether they be in the military service or otherwise, are salaried personnel, no question generally arises as to the legal principles of the rule of *respondeat superior* (let the master answer). Accordingly, the Government is responsible for the negligent acts of its employees that are committed during the course of their employment. As a result, and because of the guarantee of solvency and the relative ease of collectibility of a judgment against the Government, malpractice suits are usually brought either against the Government alone or against the Government as a codefendant with the allegedly negligent physician-employee.

Instances of suits against Government employees alone under the Federal Tort Claims Act have been, and it would seem should continue to be, relatively rare. As to further protection, the physician-employee may request, and the Department of Justice will authorize, the U. S. Attorney of Jurisdiction to assume the

defense of the employee, where to do so would best serve the interest of the United States.

Beginning with the 2 February 1957 issue, selected articles on medical professional liability have been appearing in the *Journal of the American Medical Association*. These articles will be reprinted in booklet form and will be available on request from the American Medical Association.

". . . As to the Abuses I meet with . . . you must know I number among my Honours. One cannot behave so as to obtain the Esteem of the Wise and Good, without drawing on one's self at the same time the Envy and Malice of the Foolish and Wicked, and the latter is a Testimony of the former. The best Men have always had their Share of this Treatment, and the more of it is in proportion to their different and greater degrees of Merit. A Man has therefore some Reason to be asham'd of himself when he meets with none of it. And the World is not to be condemn'd in the Lump because some bad People live in it . . . ."

—BENJAMIN FRANKLIN
London
Mar. 2, 1767

DISTINGUISHED VISITORS TOUR ARMY HOSPITAL IN GERMANY

During a 20-day field demonstration, the U. S. Army 46th Surgical Hospital at Landstuhl, Germany, received visitors from all over Europe. Among them were NATO team member General Raffaele Squillacioti, who is the Italian Surgeon General, USAREUR Medical-Surgical Conferees, and Army nurses attending a workshop here.

General Squillacioti examining the new polaroid roentgenogram processing unit.

General Squillacioti's tour of the mobile Seventh Army unit was representative of the reception accorded all the inspectors. Accompanied by his interpreter, Major Antonio Mazzarella, the Surgeon General was briefed by Captain Bryan T. Lowe, hospital commander. Captain Lowe underscored the unit's mobility by stating, "Within two hours the 46th can be set up and ready to admit patients." He explained that its mission is to receive and care for nontransportable casualties.

At the request of General Squillacioti, a résumé of the hospital's record followed, which emphasized its efficient performance in Korea as the 351st Surgical Hospital.

The Italian visitor began his inspection in the preoperative ward, where he observed admission procedures. He then proceeded to surgery, and described a display of surgical instruments as "among the finest I've seen." He contrasted the adjustable operating table with the fixed type used by the Italian Army.

In the X-ray Division, a polaroid filming and processing unit, one of the first employed by a field outfit, was demonstrated. This new technic requires only 1 minute and produces a positive rather than a negative roentgenogram. The routine method, used for detailed work, requires 10 minutes and yields a negative.

Viewing the nonmedical sections, General Squillacioti registered approval and amusement at the "Man from Mars" rubber decontamination uniforms worn by chemical, bacteriologic, and radiologic teams.

HOW TO HOLD YOUR AUDIENCE

In a scientific meeting, like it or not, people will not listen to you unless you can catch and hold their interest. For this reason, the presentation of a scientific paper is in some respects a show, and details of showmanship must be exploited. The nourishing of a stream of interest in an audience requires the use of "props"—usually lantern slides, occasionally models or exhibits—in which must be combined the unexpected, the pleasing, and the familiar with a slight variation. In this material, color, composition, and lighting (or ease of viewing) are of first importance.

—ROBERT P. BARDEN, M. D.
in *Radiology*
p. 875, June 1954

ADMIRAL HOGAN RECEIVES GEORGETOWN UNIVERSITY AWARD

Rear Admiral Bartholomew W. Hogan, Surgeon General of the U. S. Navy, received the Georgetown University Vicennial Medal in recognition of many years of faithful and distinguished service, at cermonies held during the Founder's Day Convocation on 25 March 1957.

Front and back of Georgetown University Vicennial Medal awarded to Admiral Hogan.

The Georgetown University Vicennial Medal was struck as a symbol of gratitude and respect to the men who have devoted twenty or more years to Georgetown in her advancement in education. Admiral Hogan has been Associate Professor of Psychiatry at the University Medical School since 1936.

OFFICERS CERTIFIED BY SPECIALTY BOARDS

Supplementary Listing

According to information from the Offices of the Surgeons General of the military medical services, the following regular Medical, Dental, and Veterinary Corps officers have been certified by the boards indicated since the listings published in previous issues of this *Journal*.

American Board of Orthopaedic Surgery

Harry B. Eisberg, Capt., USN

American Board of Internal Medicine

Nicholas G. Battiglieti, Maj., USA
Stephen J. Bette, Lt. Col., USA
Ray F. Fitch, Capt., USAF
Donald L. Howie, Lt. Col., USA

American Board of Pathology

Joseph F. Metzger, Maj., USA
John P. Ray, Jr., Capt., USA

American Board of Ophthalmology

Kenneth Somers, Col., USA

American Board of Surgery

Strother B. Marshall, Capt., USAF
James E. McClenathan, Lt. Comdr., USN
William C. Rountree, Maj., USAF
William C. Turville, Comdr., USN
Edward H. Vogel, Jr., Lt. Col., USA

American Board of Preventive Medicine

Public Health

Herschel E. Griffin, Lt. Col., USA

Board of Thoracic Surgery

(A Subsidiary Board of the American Board of Surgery)

Frank E. Hagman, Col., USA
Thomas H. Hewlett, Lt. Col., USA

American Board of Oral Pathology

Henry H. Scofield, Jr., Lt. Comdr., USN

American Board of Oral Surgery

Gerald H. Bonnette, Capt., USN
Donald E. Cooksey, Capt., USN
Edward A. Gargiulo, Comdr., USN
David Hazard, Lt. Col., USA

American Board of Pedodontics

Gordon H. Rovelstad, Comdr., USN

American Board of Periodontology

Claud M. Fraleigh, Capt., USN
Jerome F. Peters, Comdr., USN

American Board of Prosthodontics

Milton H. Brown, Capt., USN
Benjamin W. Dunn, Col., USAF
John R. Frost, Lt. Col., USA
Charles M. Heartwell, Capt., USN
Davis Henderson, Capt., USN
Frederick R. Krug, Lt. Col., USA
Allen L. McInturff, Capt., USN

American College of Veterinary Pathologists

James E. Cook, Capt., USAF
Donald H. Yost, Capt., USA

American Board of Veterinary Public Health

Lester J. Gorman, Lt. Col., USAF
Mulford C. Lockwood, Lt. Col., USA

Stop!

The American-Korean Foundation and the United States Army Medical Service have announced the discontinuation of their ioint project of shipping to Korea medical books contributed by individual physicians, medical schools, hospitals, and state and local medical societies. Books should not be sent to the Sharpe General Depot in California as in the past, for facilities no longer exist for packing and transshipping to Korea.

The response of physicians and medical groups throughout the country to the appeal for books for Korean medical schools has been so generous that further contributions are not needed. As a result of this program, over 77 tons of medical texts, references, and periodicals, valued at $76,000, have been shipped to Korea for distribution to Korean medical schools.

A. M. A. Military Medicine Section Meeting

A stimulating professional program will be presented at the annual meeting of the Section on Military Medicine of the American Medical Association's Scientific Assembly. The meeting will be held in the Coliseum, located at Columbus Circle in New York City, during the afternoons of 4, 5, and 6 June.

Speakers and discussants on the program include many prominent military and civilian physicians and scientists, who will present a wide variety of timely and interesting topics.

Among the exhibits of the Military Medicine Section to be shown are:

Acute Respiratory Illness of Adenovirus (RI-APC) Etiology in Military Populations
Disease-Free Laboratory Animals
Newer Approaches to the Study of Liver Diseases
Pediatric Diagnostic Clinic
Psychiatry in the U. S. Navy's Operation Deep Freeze
Clinical Diagnostic Studies Utilizing Radioactive Isotopes
Present-Day Method of Moving Poliomyelitis Patients
Eye Protection Against Minute-High Speed Missiles
U. S. Air Force Occupational Health Program

The chairman of this section is Colonel Russel V. Lee, USAFR (MC), Inactive; and the secretary is Captain Cecil L. Andrews, MC, USN. The chairman's opening address will be on "The Military Surgeon—a Specialist."

Point credits for retirement may be earned by all eligible Reserve Medical Corps officers of the Army, Navy, and Air Force who register their attendance.

Kimble Methodology Research Award for 1957

Nominations for the Sixth Kimble Methodology Research Award will be accepted until 1 June 1957 by the Conference of State and Provincial Public Health Laboratory Directors. This award, established by the Kimble Glass Company, Toledo, Ohio, consists of $1,000 and a silver plaque, and will be presented at the annual meeting of the Conference in Cleveland, Ohio, in November 1957.

Candidates must be from the United States, its territories, or Canada.

To be considered for nomination their work should be either, (a) a fundamental contribution that serves as a baseline for development of diagnostic methods which fall within the province of the public health laboratory, or (b) the adaptation of a fundamental contribution to make it of use in a diagnostic laboratory.

Nominations may be made by authors, their associates, or others. A nomination should be accompanied by a statement justifying the recommendation, six summaries of the work, and six reprints. If reprints are not available, six summaries with bibliography will be accepted. Nominations may consist of a group of workers or one author. If the former, the cash award will be divided among the workers but the plaque accompanying the cash award will become the property of the laboratory where the work was done.

Nominations should be sent to Howard L. Bodily, Ph. D., Chairman, Nominating Committee, Kimble Award; State Department of Public Health, Division of Laboratories, 2151 Berkeley Way, Berkeley 4, Calif.

DEATHS

BEXFIELD, Henry Nielsen, Major, MSC, USAR, of San Luis Obispo, Calif.; stationed at Detachment 2, 9771 Technical Unit, Dugway, Utah; attended the University of Illinois College of Pharmacy 1921 to 1923; commissioned a Second Lieutenant in the Army of the United States on 24 March 1943; died, 20 December 1956, age 57, at Fitzsimons Army Hospital, Denver, Colo., of lymphoblastic sarcoma of the lung.

BOUDREAU, Frederick Joseph, First Lieutenant, DC, USAR, of Philadelphia, Pa.; stationed at 665th Medical Detachment, Korea; graduated in 1956 from Temple University School of Dentistry, Philadelphia, Pa.; commissioned a First Lieutenant in the U. S. Army Reserve and ordered to active duty, 14 June 1956; died 22 February 1957, age 25, in Korea, due to an aircraft accident.

CARPENTER, Sharon Opal, First Lieutenant, ANC, USAR, of Washington, D. C.; stationed at 33d Station Hospital, USAREUR; attended St. Mary's College of Nursing, Calif., and University of San Francisco, Calif.; entered the military service 30 June 1943 and commissioned a Second Lieutenant in the U. S. Army Reserve 22 April 1953; died 22 February 1957, age 32, at Letterman Army Hospital, San Francisco, Calif., of astrocytoma, left cerebral hemisphere.

EDDY, Arnold Austin, Captain, MSC, USAR, of Detroit, Mich.; stationed at Fort Leonard Wood, Mo.; entered military service 22 August 1938; commissioned a Second Lieutenant in the Army of the United States 9 June 1943; died 25 February 1957, age 38, at U. S. Army Hospital, Fort Leonard Wood, Mo., of cirrhosis of the liver.

SHINABERGER, George Benjamin, Second Lieutenant, MSC, USAR, of Atlanta, Ga.; stationed at Headquarters, 3d USA Student Detachment, Emory University, Atlanta, Ga.; attended Emory University 1953 to 1956; commissioned a Second Lieutenant in the U. S. Army Reserve and ordered to duty 3 September 1956; died 26 January 1957, age 24, at Atlanta, Ga., of multiple fractures and lacerations, the result of an automobile accident.

SUMNER, John Worthington, Jr., Lieutenant Colonel, MC, USA, of Portland, Conn.; stationed at Second General Hospital, Germany; graduated in 1941 from Columbia University College of Physicians and Surgeons, New York, N. Y.; commissioned a First Lieutenant in the U. S. Medical Reserve Corps 3 June 1941 and Captain in the Regular Army 12 July 1946; died 24 February 1957, age 42, at the Second General Hospital, Germany, of myocardial infarction.

THOMAS, Howell Alexander, Lieutenant Colonel, DC, USAR; of Aransas Pass, Tex.; stationed at Headquarters and Headquarters Detachment, U. S. Army Hospital, Fort Sill, Okla.; graduated from Baylor University College of Dentistry, in 1927; commissioned a First Lieutenant in the U. S. Army Reserve 13 July 1929 and ordered to active duty 9 July 1942; released from active duty 5 March 1945 and returned to active duty 12 February 1951; died 5 February 1957, age 54, at Brooke Army Hospital, Fort Sam Houston, Tex., of a fulminating infection.

ROYAL AIR FORCE OFFICER COMMENDED FOR ACHIEVEMENTS IN AVIATION MEDICINE

In a ceremony at the Pentagon on 27 March 1957, Wing Commander E. Bruce Harvey, Royal Air Force, was presented with a letter of commendation from the Department of Defense by Dr. Frank B. Berry, Assistant Secretary of Defense (Health and Medical).

Dr. Frank B. Berry presenting letter of commendation to Wing Commander E. Bruce Harvey in the presence of the Surgeons General of the United States Army, Major General Silas B. Hays, the United States Navy, Rear Admiral Bartholomew W. Hogan, and the United States Air Force, Major General Dan C. Ogle.

The commendation, signed by the Honorable Charles E. Wilson, Secretary of Defense, is reproduced on the opposite page.

THE SECRETARY OF DEFENSE

WASHINGTON

15 March 1957

Subject: Commendation

To: Wing Commander E. Bruce Harvey, Royal Air Force

With the full endorsement of the Surgeons General of the United States Army, Navy, and Air Force, the Department of Defense commends you for your significant achievements in the field of aviation medicine during your tour of duty in Washington, D. C., as Royal Air Force Liaison Officer to the United States and Canada. This commendation refers particularly to your initiative and foresight in recognition of one of the major problems in aviation medicine, and for your diligence and industry which led to the establishment of the Joint Committee on Aviation Pathology.

This problem is the unexplained major aircraft accident with its resulting fatalities. Excellent research work has been accomplished in both of our nations bearing on the causative factors involved. In your country, the brilliant work of Armstrong, Fryer, Stewart, and Whittingham has contributed notably to an understanding of the Comet accidents in 1954. Stimulated by these investigations, you displayed vision and resourcefulness in arousing the military medical services of the Department of Defense, and of the Royal Air Force, the Royal Navy, and the Royal Canadian Air Force to the desirability of uniting their efforts in a combined and comprehensive study of the human component in aircraft accidents through a Joint Committee on Aviation Pathology. This Committee promises to be a cogent force in the development of tri-partite action for the prompt collection and dissemination of pertinent clinical, physiologic, pathologic, and experimental information to eliminate duplication of effort in our countries and hasten the progress of aeromedical research.

By your superior devotion to duty, keen professional judgment, and diplomatic skill you have contributed immeasurably to the progress of aviation medicine and flight safety. At the same time, you have enhanced the bonds of friendship among the United Kingdom, Canada, and the United States, and coordinated a mutually beneficial approach to the solution of the causative factors of major aircraft accidents.

A copy of this letter has been forwarded to your superior officer with the request that it be made a part of your official record.

C. E. Wilson

CORRESPONDENCE

To the Editor:—I read the article on the "Treatment of Paraphimosis" in the March 1957 *Journal* and was quite interested. I recently served in Korea and was called upon to treat several patients with paraphimosis. I never encountered as severe a case as described in the article, but did have two with acute paraphimosis. Although they were devoid of infection or necrosis, manual reduction was not possible and both patients were considered for surgical intervention by a dorsal slit. Before resorting to surgery, which would have been impractical at night at dispensary level, a half cc of hyaluronidase was injected into the edematous foreskin and massaged gently. Within five minutes the foreskin was easily reduced manually. This is not a large series but in the uncomplicated case of paraphimosis it is certainly worth a try, especially at the dispensary level. I hope this might be of interest to other dispensary medical officers.

DAVID K. GINSBERG, *Captain, MC, USA*
U. S. Army Dispensary
Indiantown Gap Military Reservation, Pa.

Second European Congress of Aviation Medicine to be Held in September

The Second European Congress of Aviation Medicine will be held at Saltsjöbaden in the vicinity of Stockholm, Sweden, from 16 to 19 September 1957.

The main topics scheduled for discussion during the meeting are:

Gravitational Stress

Standardization of Tolerance Tests in Human Centrifuges

Trends in Engineering Psychology and Psychophysiology in Aviation Medicine

Decompression Sickness and Explosive Decompression

The president of the Congress is Prof. E. Hohwü Christensen, while the Chairman of the Executive Committee is Dr. Arne Frykholm. For full information in regard to the program and arrangements, address Dr. Olle Höök, Secretary General, Flygvapnet, Stockholm 80, Sweden.

Reviews of Recent Books

THE PHYSICIAN-WRITER'S BOOK, Tricks of the Trade of Medical Writing, by *Richard M. Hewitt,* A. M., M. D. 415 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

Doctor Hewitt, onetime assistant editor of the *Journal of the American Medical Association* and in recent years senior consultant, Publications Section, the Mayo Clinic, has written a very practical guide to medical writing, graphically and lucidly indicating the way to plan, develop, construct, and finally finish a contribution to the medical literature. For many years now, the profession has been in need of such a guide to medical writing.

The author, with his mature outlook, thoroughly understands the problems confronting the busy physician who wishes to publish his observations. He indicates the many pitfalls to avoid, and adequately demonstrates by example how this can be accomplished.

The author shows how to avoid "medicalese," "verbal-arithmetical muddles," and the use of unauthorized abbreviations; emphasizing the value of clarity, brevity, and good taste in the medical manuscript. He brings out by example the value of illustrations, the proper use of tables, and even how to properly construct a sentence and build a paragraph. There is a valuable and interesting appendix which serves to elaborate on the textual material. The cross-referenced index makes it easier for the reader to locate his precise point of interest.

This volume is of inestimable value to all physician-writers, irrespective of their experience level.

—*PAUL V. DAVIS, Col., USAF (MC)*

FUNDAMENTALS OF CLINICAL FLUOROSCOPY, With Essentials of Roentgen Interpretation, by *Charles B. Storch,* M. D. 2d revised edition. 305 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1957. Price $8.75.

The second edition of this popular text has been expanded to include new sections on neoplastic disease of the fundus of the stomach, congenital heart disease, small bowel examination, intestinal obstruction, and fluoroscopy of the gallbladder. Its purpose is to give the student an intelligent, meaningful approach to the study and application of diagnostic fluoroscopy. It is easy to read. The carefully chosen photographs and diagrams are accompanied by legends consisting of specific questions and answers to illustrate important features of diagnosis. Although the title emphasizes the subject of

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clinical fluoroscopy as compared to radiographic examination, the author stresses the importance of knowledge and skill in radiographic interpretation as a prerequisite to clinical fluoroscopy. This requirement is effectively met by a well-integrated presentation of the basic anatomy of both normal and abnormal radiographic features.

This text is highly recommended and merits the attention of those in the field of diagnostic roentgenology, and is almost indispensable to beginners in the field of clinical fluoroscopy.

—DELL F. DULLUM, Col., MC, USA

OCCUPATIONAL THERAPY, Principles and Practice, by *William Rush Dunton,* Jr., M. D., and *Sidney Licht,* M. D. 2d edition. 373 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $8.

For the physician who seeks a comprehensive orientation on occupational therapy, this book is valuable. This completely revised edition contains 16 chapters including new chapters on occupational therapy in pediatrics, geriatrics, remedial games, and music in hospitals. Each chapter was contributed by a different expert except that Dr. Dunton and Dr. Licht, in addition to serving as editors, served as author or coauthor on several chapters. Particularly interesting are the chapters on cerebral palsy by Dr. Winthrop M. Phelps and on heart disease by Dr. Paul D. White.

Orthopedic surgeons and physicians engaged in medical rehabilitation will find highly useful the chapters on kinetic occupational therapy and on the upper extremity amputee. In the latter, the dynamic approach of Rusk is reflected.

This book is sturdily bound and attractively printed. It is a "must" for the library of all who would join in the theme that the physician's duty is not fulfilled until the patient is restored to his fullest mental and physical capacity. Occupational therapy, as described in this volume, can make a major contribution in attaining this important goal.

—BENJAMIN A. STRICKLAND, JR., Col., USAF (MC)

BORDERLANDS OF THE NORMAL AND EARLY PATHOLOGIC IN SKELETAL ROENTGENOLOGY, by Prof. Dr. *Alban Köhler.* 10th edition, completely revised with reference to illustrations and to text, by Dozent Dr. *E. A. Zimmer,* Bern/Fribourg. English translation (from the 10th German edition) arranged and edited by *James T. Case,* M. D., D. M. R. E. (Cambridge). 723 pages; 1,300 illustrations. Grune & Stratton, Inc., New York, N. Y., 1956. Price $24.50.

This latest edition of a standard and excellent reference work deals, as the title indicates, with the borderlands of the normal in skeletal roentgenology. The text is concerned primarily with what might be called the minutiae of skeletal anatomy. The common as well as the rare deviations from normal that can be so troublesome to the radiologist are discussed concisely and authoritatively.

This is not a book to be picked up and read from cover to cover. The subject material is much too encyclopedic in nature to be taken in one massive dose. It is, however, a valuable and authoritative reference book that one can turn to frequently to settle a moot point. For this reason it can be vastly important in medicolegal situations.

The second edition of this work, published in 1935, has been regarded by many older radiologists as an essential source of important information. The tenth edition is greatly expanded and benefits from the experience of hundreds of observers and writers listed in the voluminous bibliography.

The roentgenograms have been reproduced in the positive and are, for the most part, of excellent quality. They were carefully trimmed before reproduction and reveal only pertinent points of interest. There are also many photographs, diagrams, and line drawings of good quality. The index is adequate and the paper and binding are excellent.

The book is recommended to all radiologists and orthopedic surgeons.

—ELMER A. LODMELL, Col., MC, USA

ADVANCES IN PEDIATRICS, Volume IX, 1957, edited by *S. Z. Levine*. 336 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1957. Price $9.

The current edition represents an improvement in this already excellent series. Among the subjects covered in this volume are postmaturity, the gamma globulins, thyroid disorders, familial dysautonomia, the coagulation disorders, and celiac disease.

Especially refreshing was the excellent summary of the effectiveness of fluoridation in the prevention of dental caries. The excellent summary of the various studies which have been carried out, presented here by Schlesinger and Ast, leaves little room for doubt as to the value of this measure. The excellent statistical approach provides the pediatrician with invaluable data for reassurance to parents and civic health groups. It is not possible in this review to mention all of the articles, but all provide new and interesting observations with excellent summations.—*DANIEL STOWENS, Maj., MC, USA*

THE YEAR BOOK OF GENERAL SURGERY (1956-1957 Year Book Series), edited by *Evarts A. Graham*, A. B., M. D., with a section on Anesthesia, edited by *Stuart C. Cullen*, M. D. 647 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $6.75.

This latest annual volume in the series of surgical year books is, as before, composed of abstracts of representative articles from the surgical journals published during the past year. The book is divided into sections and articles in the various fields are grouped together. Articles are indexed by author and by subject material.

The abstracts are clear, well written, and are representative of the general trends to be found in the voluminous literature. The

editorial comments underline important or controversial points. The diagrams are well drawn and labeled.

This volume ranks with its predecessors as an excellent reference for the recent surgical literature. It should, however, be used only as a reference for a more thorough study of the original articles.

In addition, by selection and grouping of the articles the editor emphasizes recent trends in surgical thought and practice.

—PHILIP D. CRONEMILLER, Comdr., MC, USN

ATLAS OF TUMORS OF THE NERVOUS SYSTEM, by *H. M. Zimmerman,* M. D., *Martin G. Netsky,* M. D., and *Leo M. Davidoff,* M. D. 191 pages; 277 illustrations, 233 in color; 4 tables. Lea & Febiger, Philadelphia, Pa., 1956. Price $25.

This long-awaited Atlas presents, for the first time, a color treatise on tumors of the nervous system. The inadequacy with which black and white photographs depict gross and microscopic pathology is well known. The 233 color illustrations in this volume must represent the largest color collection on pathology in print.

The authors, two neuropathologists and a neurosurgeon, are well qualified to collect and present the material. The student and teacher in the fields of neurology and neuropathology have long been familiar with the various papers of Zimmerman and Netsky, and the papers and books of Davidoff on the central nervous system are well known.

As with any color printing, there are a few plates that do not appear to be "true" color. However, the majority of the plates are faithful reproductions.

The clinical and pathologic features of the various tumors are succinctly reviewed. An extensive bibliography covering the major works on each tumor is presented in the appendix.

This atlas will be useful to the student and teacher in the fields of clinical neurology, neurosurgery, and neuropathology. It will be an excellent guide for the candidate reviewing for American Board examinations.—*ROBERT L. WILLIAMS, Maj., USAF (MC)*

CLINICAL PATHOLOGY, Application and Interpretation, by *Benjamin B. Wells,* M. D., Ph. D. 2d edition. 488 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $8.50.

Clinical pathology is truly the fusion of the laboratory and the bedside. A textbook on clinical pathology as written by the internist provides the medical student and physician guidance in the interpretation of the laboratory report. This book attempts to cover the entire range of clinical pathology from infectious diseases through the diseases of the various organs. Chapters are also included on clinical laboratory studies in surgery and in obstetrics.

The author's objectives are commendable and his introductory considerations are admirable. In essence, he reaffirms the place of the physician in the care of the patient and advocates the use of the laboratory wisely, judiciously, and properly.

This book will serve as a compendium identifying the large variety of procedures and giving elementary interpretation. It will demonstrate that the clinical pathologist needs to assist the internist in the selection and interpretation of laboratory tests for the clinical patient.

—ABRAM S. BENENSON, Lt. Col., MC, USA

MANUAL OF ANESTHESIOLOGY For Residents and Medical Students, by *Herman Schwartz*, M. D.; *S. H. Ngai*, M. D.; and *E. M. Papper*, M. D. American Lecture Series, Publication No. 298, A Monograph in The Bannerstone Division of American Lectures in Anesthesiology, edited by *John Adriani*, M. D. 170 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $4.25.

This 170 page manual is written for the medical student and resident in anesthesiology. It has achieved its avowed purpose by simple and concise wording. Nurse anesthetists should also find it useful.

The chapters on the physiology of respiration and circulation are particularly outstanding because of their clarity, simplicity and excellent illustrations. The anatomy of the upper respiratory tract is well demonstrated. The chapter on physics as related to anesthesiology is useful in reviewing for board examinations. The beginner will find enough information in this chapter to understand the primary problems in medical physics.

The chapters devoted to clinical technics are short and informative, while one of the longer chapters is devoted to pediatric anesthesia. This manual summarizes information needed by medical students for their course in anesthesiology. The nurse anesthetist student should find it useful as a text of basic information. The physician should find it an excellent book to familiarize himself with the entire problem of administering anesthetics.

The physician reviewing for examinations might find these capsules of information a stimulus to further reading.

—ARTHUR B. TARROW, Col., USAF (MC)

THE RECURRENT LARYNGEAL NERVES IN THYROID SURGERY, by *William H. Rustad*, M. D. 47 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $4.50.

This monograph is written in a clear, concise, and easy-to-read fashion. The first portion of the book very effectively reviews the historical background and gives a brief but complete discussion of the functional anatomy of the larynx, the embryology and anatomy of the recurrent laryngeal nerves, and an excellent summary of the clinical considerations necessary in the surgery of this area. The second portion is concerned with 11 groups of excellent anatomic

illustrations accompanied by concise descriptive material portraying the marked variability of the anatomy as found on dissection of 125 cadavers.

This book is certain to stimulate increasing caution even by the most seasoned thyroid surgeon. It will be most useful to the trainee and as a quick review prior to performing operations of this region.

—OAKLEY K. PARK, Lt. Col., USAF (MC)

AMINO ACID HANDBOOK, Methods and Results of Protein Analysis, by *Richard J. Block,* Ph. D., with the co-operation of *Kathryn W. Weiss,* A. B. 386 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $10.50.

Dr. Block's most recent monograph provides detailed procedures for the determination of amino acids present in virtually any material, plus a wealth of information concerning the amino acid composition of a wide range of proteins, polypeptides, and foods. Consistent with the *handbook* objective of this volume, there are more than 66 pages of references to the literature on protein analyses. A similar magnitude of space is devoted to tabular presentations of the amino acid composition of animal, plant, enzyme, virus, and food proteins. Dr. Herman J. Almquist has contributed a chapter on methods pertinent to the study of protein and amino acid requirements of animals.

The section on methodology begins with a very ample consideration of the means by which the specimen is prepared for analysis, including methods for the determination of nitrogen, the removal of lipids, nucleic acids, carbohydrates, inorganic ions, and the hydrolysis of proteins. Thereafter, there is a presentation of procedures for the determination of amino acids by chemical and microbiological methods and by the use of paper and column chromatography. The chapters dealing with the employment of micro-organisms and column chromatography were written by Dr. Sidney Saperstein and Dr. William G. Gordon, respectively.

The protein chemist will welcome this volume as a most valuable compendium of tested information concerning methods and results of amino acid analyses. The latter data will also serve well the needs of the various specialists who may require a knowledge of the natural availability of particular amino acids.

—THADDEUS J. DOMANSKI, Col., USAF (MSC)

CYTOLOGIC TECHNICS, For Office and Clinic, by *H. E. Nieburgs,* M. D. 233 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price $7.75.

This small volume is packed with information and methods for cytologic examination. In the 14 years since the publication of Papanicolaou's monumental work on the diagnosis of cancer by vaginal smear, cytological examinations have found an ever increasing field of application in cancer detection and treatment. The author has

gathered and condensed from his own wide experience and from the literature the most useful and important technics of cytology. Instruments and methods of collecting specimens are described. In addition to staining technics and diagnostic criteria, other facets such as laboratory organization and the training of technicians are covered and elaborated on with excellent photographs, photomicographs, charts, and diagrams. All physicians can find this book a valuable reference on cytology.

—ROALD N. GRANT, Capt., MC, USN

PRE AND POST OPERATIVE CARE IN THE PEDIATRIC SURGICAL PATIENT, edited by *William B. Kiesewetter,* M. D. 347 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $7.

This compact volume on the pre- and post-operative care of infants and children is an excellent manual for the pediatric surgeon. The text, written in outline form, is adequate and concise. It contains some standard formulas for the treatment of dehydration, acidosis, and other electrolyte problems that are valuable to the practicing surgeon as well as to the student. There are times when the surgeon does not have a qualified pediatrician available, and the material in this book helps in a measure to supply that need. As stated in the foreword, the replacement of blood, the maintenance of electrolyte balance, and skillful anesthesia have made possible the performance of extensive surgery in infancy and childhood. The preparation of the patient for operation and the principles of healing are dealt with in this work. Each chapter provides a helpful bibliography for more extensive reading on subjects mentioned in the text. This book is quite well adapted to the needs of trainees in general surgery.

—ROBERT L. RHEA, Jr., Col., MC, USA

ANESTHESIA FOR SURGERY OF THE HEART, by *Kenneth K. Keown,* M. D., F. A. C. A. American Lecture Series, Publication No. 304, A Monograph in The Bannerstone Division of American Lectures in Anesthesiology, edited by *John Adriani,* M. D. 109 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $3.75.

This volume is a handbook summarizing the author's knowledge gained during 10 years of experience with anesthesia in cardiac surgery. The history of open-thorax anesthesia is traced from the 16th century. A complete list of cardiac irregularities is classified and discussed as to cause, diagnosis, treatment, and significance. The most commonly occurring complications during anesthesia are noted, and emphasis is placed on prevention. The anesthesiologist's role in postanesthetic management is emphasized.

Each cardiac defect for which operation is accomplished is given a specific chapter. This includes the pathologic physiology, signs and symptoms, roentgenographic and electrocardiographic findings, and data found by cardiac catheterization. Criteria for selection of patients for operation are enumerated, with descriptions of preanesthetic medication

for each type of procedure. The necessity for the cardiologist, surgeon, and anesthesiologist to work as an integrated team is emphasized.

The table of contents is detailed and eliminates the need for an index. There are no pictures nor illustrations, except those showing catheterization data. This book is well organized, clearly written, practical, and basic. It contains a lot of worthwhile information for any anesthesiologist and is an excellent manual for teaching.

—*ROBERT E. LAU, Lt. Col., USAF (MC)*

LESIONS OF THE CERVICAL INTERVERTEBRAL DISC, by *R. Glen Spurling*, M. D. American Lecture Series, Publication No. 301, A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by *Michael E. DeBakey*, M. D., and *R. Glen Spurling*, M. D. Neurosurgery Division, edited by *Barnes Woodhall*, M. D. 134 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $4.75.

This volume is another of the American Lecture Series Monographs, consisting of 134 pages devoted to a concise, carefully written study of the anatomy, pathology, diagnosis, and management of cervical disk disease. There is a selected bibliography which includes the classical contributions to the literature. The 41 illustrations are effective.

The chapter on anatomy is confined to the clarification of the structural features pertinent to the subject. The section on the origin and pathology of cervical disk lesions is the most interesting part of the book, and the new thinking and experimental work are reviewed in a clear, logical manner. The remainder of the book outlines the diagnosis, management, and results of treatment, using case histories as effective illustrations. This latter portion of the book is a positive presentation of the author's methods and experience. Most of the views are those in common acceptance among neurosurgeons.

A portion of the discussion concerning the effects of midline disk herniation and posterior vertebral osteophytes should be required reading for all clinicians. It emphasizes the dire consequences of overlooking these amenable, but often insidious, lesions.

The author has succeeded in making the book appealing to all physicians who deal with this often misunderstood syndrome. The reviewer believes that this admirable monograph will become as popular and authoritative as the author's classical book, "Lesions of the Lumbar Intervertebral Disc."

—*ARTHUR L. SCHULTZ, Capt., MC, USN*

PEDIATRIC CARDIOLOGY, by *Alexander S. Nadas*, M. D., F. A. A. P. 587 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

This excellent, well-illustrated book is arranged in four parts for the convenience of the physician interested in a particular phase of pediatric cardiology. It is an outstanding presentation devoid of all

repetitive syndromes and obsolete teachings which have appeared in most texts during the last few generations. The congenital heart lesions are clarified and handled in a practical manner, identifying them by their anatomic and physiologic abnormalities.

The material presented is based on the author's experience during the past 10 years in the Children's Medical Center in Boston. The clinical and hemodynamic features as delineated are quite similar to those which have been observed in the Congenital Heart Clinic at Walter Reed Army Hospital, in a 6-year study of over 1,200 patients.

The book expresses the teachings and experience of recognized authorities in other fields with whom the author has been associated. These include such teachers as Clement A. Smith, Dr. Edward B. D. Newhauser, Robert E. Gross, and Walter T. Goodale.

This book fills the requirement for a much needed handy text and reference book on the subject of pediatric cardiology.

—THOMAS W. MATTINGLY, Col., MC, USA

CLINICAL USE OF RADIOISOTOPES, by *William H. Beierwaltes,* M. D.; *Philip C. Johnson,* M. D.; and *Arthur J. Solari,* B. S., M. S. (Physics). 456 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957. Price $11.50.

This text, written by the personnel of the Isotope Unit at the University of Michigan Hospital, is the result of almost 10 years of teaching experience in the field. It is directed toward the resident and practicing physician and fills a need for a basic textbook.

Most of the volume is devoted to the common uses of isotopes in today's clinical practice, and each chapter includes a review of anatomy, physiology, and pathology, as well as the isotope's applications. Approximately one third of the book is devoted to the use of I^{131} in the diagnosis and treatment of thyroid problems, since this is by far the most common use of isotopes today. Separate chapters discuss the use of radioactive phosphorus and gold. The use of chromium, cobalt, and iron in various diagnostic tests is particularly well described.

The only possible criticism of the book is its weakness in dosimetry, which is not unusual in most of the American literature. The common instruments are discussed and their fundamental circuits are illustrated. An appendix lists the formal radioisotope training courses, but does not include the courses at Walter Reed Army Medical Center, Washington, D. C., and the National Naval Medical Center, Bethesda, Md. Courses have been conducted at these installations for a number of years for military medical officers.

This book should provide a valuable addition to the limited library that is now available to people in the isotope field.

—JAMES B. HARTGERING, Lt. Col., MC, USA

MEDICAL SCIENCES, Volume I, Series VII of Progress in Nuclear Energy, edited by *J. C. Bugher, J. Coursaget,* and *J. F. Loutit.* 165 pages. McGraw-Hill Book Co., Inc., New York, N.Y., 1956. Price $6.

This is the Medical Science volume of a new series of eight books based primarily on the papers presented at the International Conference for the Peaceful Uses of Atomic Energy held at Geneva in August 1955. A companion volume (Series VI) on the Biological Sciences is scheduled for early release. These two volumes will highlight the several hundred papers presented in these fields and originally published by the United Nations in six volumes.

In this edition, the editors have selected papers relating to the role of radioisotopes in medical diagnosis and therapy, illustrating new as well as established technics of the use of these tools, both externally and internally. In addition, the principles of radiation safety, the development of the concept of "maximum permissible exposure," and some of the attendant administrative and legal problems are thoroughly covered. Finally, G. Failla has written an excellent chapter on tissue dose concepts in terms of the rad—the international unit of absorbed dose.

The selected papers include succinct reviews by leading authorities, as well as heretofore unpublished technics or special adaptations, and are arranged in such a way as to present a concise and coherent picture of the present state of the art in the clinical applications of nuclear energy. Where appropriate, the editors have added clarifying remarks or additions. The chapters on Diagnosis by Belcher and Mayneord, and Radioactive Materials for Internal Therapy by J. S. Mitchell, are of particular value.

For the physician who does not have access to or time to study the original volumes published by the United Nations, the editors have compiled an authoritative, concise, and readable version.

—JAMES B. HARTGERING, Lt. Col., MC, USA

COMPARATIVE ANATOMY OF THE EYE, by *Jack H. Prince,* F. B. O. A., F. S. M. C., F. R. M. S., F. Z. S. (London). 418 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $8.50.

It is interesting and refreshing to come across a book on an unusual and relatively little-known phase of ophthalmology. The book is interesting to read, or even just to scan, and has been made especially interesting and instructive by a liberal use of tables, drawings, sketches, and photographs.

The author confines his work for the most part to the vertebrates, from fish to mammals, except for a small chapter on the invertebrates. He has systematized his study on an anatomic basis, comparing similar anatomic structures of representative animals in each major group, including man.

The "practical" ophthalmologist will not find anything here that will help him to treat patients, but the well-read ophthalmologist will

find much of interest. The researcher and serious student of comparative ophthalmology will find this work a treasure. The book's value is enhanced by its comprehensive bibliography, glossary of animal names, rapid reference table, and chapter on comparative ocular dissection. —*KARL D. MACMILLAN, Col., MC, USA*

PRACTICAL DIAGNOSIS AND TREATMENT OF LIVER DISEASE, by *Carroll Moton Leevy*, M. D. Foreword by *Franklin M. Hanger*, M. D. Illustrations by *Felix Traugott*. 336 pages; 84 illustrations, including 23 in full color. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, New York, N. Y., 1957. Price $8.50.

The author describes a method for correlating the clinical, biochemical, and histologic changes that occur in disorders of the liver so that the disease processes might be better understood and treated. This book is intended as a guide for the practicing physician. The conclusions drawn are based on results of research and experience in 1,000 consecutive cases hospitalized with various hepatic disorders.

The chapter on clinical diagnosis is excellently presented with case reports, and with an explanation of each symptom of liver disease and the mechanism of its development. The various laboratory procedures and the differential diagnosis of jaundice are discussed in great detail. The author outlines those tests of function which can be most readily used by the busy clinician with a small laboratory.

There is an excellent bibliography at the end of each chapter, and illustrations of the microscopic histopathology are scattered throughout the book. This is an excellent book for a student, the general practitioner, and the internist.—*EDWARD P. McLARNEY, Capt., MC, USN*

ULTRAMICRO METHODS FOR CLINICAL LABORATORIES, by *Edwin M. Knights, Jr.*, M. D.; *Roderick P. MacDonald*, Ph. D.; and *Jaan Ploompuu*. 128 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1957. Price $4.75.

There is no question but that the universal adoption of ultramicro methods in the clinical chemistry laboratory would result in the elimination of untold numbers of agonizing venipunctures.

Every laboratory director must consider the possibility of instituting ultramicro (microgram and microliter) methods, especially if he is required to do blood chemistry in infants and children. This small volume will help him to make a decision, and having made it, help him in implementing it. The authors describe the apparatus in their own laboratory at Harper Hospital in Detroit, Mich., and their single procedure for each type of determination.

Explicit directions are given for a comprehensive battery of examinations. Well-chosen references to the pertinent literature enable the reader to expand his comprehension at any desired point. The inevitable "recipe-book" tedium is relieved by short but pithy discussions of interpretations.

It should be noted also that these technics are widely useful in experimental studies on small animals.

—*ROBERT L. GRISWOLD, M. D., Ph. D.*

THE GIST OF OBSTETRICS, by *H. B. Atlee,* M. D., F. R. C. S. (Ed & Can.), F. I. C. S. Illustrated by *Garth Vaughan,* M. D., C. M. (Dal). 327 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $6.

This is a new book written by the head of the Department of Obstetrics and Gynecology at Dalhousie University, Halifax, N. S., Canada, and is the outgrowth, as he states in the foreword, of mimeographed notes for his students. The author makes no claim of originality of subject matter, but he can claim originality of presentation and style. He presents the subject as "we, their teachers, were practicing it in Halifax." The style is "homely," chatty, lucid, concise, and interspersed with wit and humor—a rare ingredient of modern "tomes."

This book lives up to its title. Either *good* or *modern* could properly be inserted into the title before "Obstetrics." It is hoped that this valuable book will remain what it is and not deteriorate, in succeeding editions, into a mediocre or second-rate textbook, as has happened to some of its predecessors. It is well bound, very readable typographically, and adequately illustrated with uncluttered line drawings.

The book can be highly recommended for student use and is a valuable, quick, practical source of compact, easily available information for interns, residents, and general practitioners.

—*ROY E. CROWDER, Capt., MC, USN*

THE TREATMENT OF FRACTURES, by *Lorenz Böhler,* M. D. Volume II, translated from the 13th German edition by *Otto Russe,* M. D., and *R. G. B. Bjornson,* M. D. 5th edition in English. Pages 1073-1508, Chapters 49 to 74. 941 illustrations. Grune & Stratton, Inc., New York, N. Y., 1957. Price $17.50.

This entire second volume is devoted exclusively to disabilities of the femur. The first 93 pages present a thorough discussion of traumatic dislocations and gunshot wounds of the hip. Nearly 200 pages present the problems involved in femoral neck and intertrochanteric fractures. This is quite thorough and clearly points out essentials for success and reasons for failure in the treatment of these troublesome fractures. Discussion of the various other fractures of the femoral shaft and condyles, including missile fractures, comprise the remainder of the text.

It is somewhat surprising to see in print repeated recommendations for the use of heat in treating patients in shock. The assurance that femoral neck nonunions unite readily merely by performing closed reduction and nailing without any freshening of the fracture site may arouse skepticism. One case of 22 years' duration was so treated and healed solidly. Union is claimed for 87 per cent of 100 cases by this method!

Excellent illustrations are profuse and are better co-ordinated with the text than in the first volume. —*WALTER R. MILLER, Capt., MC, USN*

MEDICAL DEPARTMENT, UNITED STATES ARMY. Surgery in World War II. Orthopedic Surgery in the European Theater of Operations. 397 pages; illustrated. Editor-in-Chief, Colonel *John Boyd Coates, Jr.*, MC; Editor for Orthopedic Surgery, *Mather Cleveland*, M. D.; Associate Editor, *Elizabeth M. McFetridge*, M. A. *Historical Unit, Army Medical Service, Office of the Surgeon General, Department of the Army*, Washington 25, D. C., 1956. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $4.

This excellent history of orthopedic surgery in World War II is a compilation of reports and clinical studies furnished by surgeons in the European Theater and skillfully edited by the Senior Orthopedic Consultant, Colonel Mather Cleveland. Operational errors as well as successes are clearly defined and statistically recorded. Military and civilian surgeons alike will find this book of great value and timely interest.

The 397-page volume consists of three parts: administrative practices, clinical policies, and management of orthopedic injuries. The illustrations and printing are of superior quality and the type is easily read. There are two valuable appendixes, the first dealing with care of battle casualty directives and the second, a proposed revision of the orthopedic section of the Manual of Therapy. This section alone is well worth the thoughtful attention of every military surgeon and should be required reading.

More than 70 per cent of the casualties who survived in both world wars had wounds involving the upper or lower extremities. Considering the total troop strength in the European Theater of Operations approximated 3½ million men, one may appreciate the magnitude of the task which confronted the 243 military orthopedic surgeons assigned to this theater. Tribute should be paid to the two Senior Orthopedic Consultants, Colonel Rex L. Diveley, MC, and Colonel Mather Cleveland, MC, as well as the 16 Junior Consultants, for the success of the planned program and the competent treatment of bone and joint casualties.

Unfortunately, practically none of the experiences of World War I regarding the management of these injuries were put to immediate use in World War II. Treatment then was largely by the trial-and-error method. Review of this material by military surgeons should accomplish a great deal toward the prevention of repetition of past mistakes. The principles of management apply whether the casualties are military or civilian, and this would be especially true in case of a nuclear attack. Specific instructions are clearly presented with emphasis upon the adequate débridement of wounds, delayed primary suture of compound fractures, immediate primary suture of wounds of the hand, and proper treatment of joint injuries. As the Editor has stressed, the last word in the treatment of war wounds has not been written, but the many important advances so arduously learned in both world wars, should not be forgotten.—*EARL W. BRANNON, Lt. Col., USAF (MC)*

New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be reviewed in a later issue.

THE GENESIS OF THE RAT SKELETON, A Laboratory Atlas, by *Donald G. Walker* and *Zolton T. Wirtschafter*. Photography by *Dean Altman*. Calligraphy by *Lloyd J. Reynolds*. 60 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $7.50.

PROCEEDINGS OF THE THIRD NATIONAL CANCER CONFERENCE, Detroit, Mich., June 5-6, 1956. Sponsored by *American Cancer Society, Inc.*, and *National Cancer Institute, U. S. Public Health Service*. 961 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1957. Price $9.

MUSCLE RELAXANTS in ANESTHESIOLOGY, by *Francis F. Foldes*, M. D. American Lecture Series, Publication No. 294, A Monograph in The Bannerstone Division of American Lectures in Anesthesiology, edited by *John Adriani*, M. D. 210 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $5.50.

NEW AND NONOFFICIAL REMEDIES 1957, Containing Descriptions of Drugs Evaluated by the *Council on Pharmacy and Chemistry of the American Medical Association*. An Annual Publication Issued Under the Direction and Supervision of the Council. 582 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1957. Price $3.35.

HANDBOOK OF DIFFERENTIAL DIAGNOSIS, by *Harold Thomas Hyman*, M. D. 2d edition, revised and enlarged. 801 pages. J. B. Lippincott Co., Philadelphia, Pa., 1957. Price $8.

PEDIATRIC DENTISTRY, by *M. Michael Cohen*, D. M. D. 607 pages; 395 illustrations including 9 in color. The C. V. Mosby Co., St. Louis, Mo., 1957. Price $14.75.

RHEUMATIC DISEASES, RHEUMATISM AND ARTHRITIS, by *Heinrich G. Brugsch*, M. D., F. A. C. P. 330 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1957. Price $10.

ALLERGIC DERMATOSES DUE TO PHYSICAL AGENTS, edited by *Rudolf L. Baer*, M. D. 110 pages; illustrated. Published by New York University Press, distributed by J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $3.

A PSYCHIATRIC GLOSSARY, by the *Committee on Public Information, American Psychiatric Association*, Washington, D. C., 1957. 56 pages. Distributed by Mental Health Materials Center, 1790 Broadway, New York, N. Y. Price $1.

THE EARLY DETECTION AND PREVENTION OF DISEASE, edited by *John P. Hubbard*, M. D. 350 pages. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1957. Price $7.50.

CONNECTIVE TISSUE IN HEALTH AND DISEASE, edited by *G. Asboe-Hansen,* M. D. 321 pages; illustrated. Philosophical Library, Inc., New York, N. Y., 1957. Price $15.

PHYSICAL EXAMINATION IN HEALTH AND DISEASE, by *Rudolph H. Kampmeier,* A. B., M. D. 774 pages; illustrated. 2d edition. F. A. Davis Co., Philadelphia, Pa., 1957. Price $9.50.

PSYCHIATRIC EDUCATION AND PROGRESS, by *John C. Whitehorn,* M. D. 48 pages. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $1.75.

THE UNITED STATES AIR FORCE DICTIONARY, edited by *Woodford Agee Heflin.* 578 pages. D. Van Nostrand Co., Inc., Princeton, N. J., 1957. Price $4.75.

PHYSIOLOGIC PRINCIPLES OF SURGERY, edited by *Leo M. Zimmerman,* M. D., and *Rachmiel Levine,* M. D. 988 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1957.

DORLAND'S ILLUSTRATED MEDICAL DICTIONARY, Including Modern Drugs and Dosage, by *Austin Smith,* C. M., M. D., and Fundamentals of Medical Etymology, by *Lloyd W. Daly,* A. M., Ph. D. Editorial Board: *Leslie Brainerd Arey,* Ph. D., Sc. D., LL. D.; *William Burrows,* Ph. D.; *J. P. Greenhill,* M. D.; and *Richard M. Hewitt,* A. M., M. D. Philological Consultants: *Paul J. Alexander,* Ph. D., and *Harry C. Messenger,* M. D. 23d edition. 1,598 pages; more than 700 illustrations and 50 plates. W. B. Saunders Co., Philadelphia, Pa., 1957. Price $12.50.

RADICULAR SYNDROMES, With Emphasis on CHEST PAIN Simulating Coronary Disease, by *David Davis,* B. S., M. D. 266 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1957. Price $6.50.

DISEASES AND DISORDERS OF THE COLON, by *Anthony Bassler,* M. D., F. A. C. P., F. A. C. G., LL. D. 217 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $6.75.

CLINICAL CARDIOPULMONARY PHYSIOLOGY, Sponsored by the *American College of Chest Physicians,* edited by *Burgess L. Gordon,* M. D., et al. 768 pages; 248 illustrations; 32 tables. Grune & Stratton, Inc., New York, N. Y., 1957. Price $15.75.

DYNAMICS OF PSYCHOTHERAPY, the Psychology of Personality Change, Volume II, by *Percival M. Symonds,* Ph. D. 440 pages. Grune & Stratton, Inc., New York, N. Y., 1957. Price $6.50.

THE FIGHT FOR FLUORIDATION, by *Donald R. McNeil.* 241 pages. Oxford University Press, New York, N. Y., 1957. Price $5.

DICTIONARY OF MICROBIOLOGY, by *Morris B. Jacobs; Maurice J. Gerstein;* and *William G. Walter.* 276 pages. D. Van Nostrand Co., Inc., Princeton, N. J., 1957. Price $6.75.

BLADDER TUMORS, A Symposium, by *Mitchell Brice, II,* M. D., et al. 92 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $4.

THE PROBLEMS OF VISION IN FLIGHT AT HIGH ALTITUDE, AGARDograph No. 13, by *Thomas C. D. Whiteside,* Ph. D., M. B., Ch. B. Published for and on behalf of The Advisory Group for Aeronautical Research and Development, North Atlantic Treaty Organization, by Butterworths Scientific Publications, London. 162 pages; illustrated. Distributed by Interscience Publishers, Inc., New York, N. Y., 1957. Price $5.

THE EVALUATION OF THERAPEUTIC AGENTS, with Special Reference to the Tranquilizing Drugs, by *Stewart Wolf*, M. D. Presented 10 October 1956, as the Academic Lecture at the Eighth Mental Hospital Institute held in Denver, Colo. Monograph Series No. 2, Mental Hospital Service, January 1957. 23 pages; illustrated. May be ordered from the American Psychiatric Association Mental Hospital Service, 1785 Massachusetts Ave., N. W., Washington 6, D. C. Price 1-4 copies $1 each; 5-9, $.80 each; 10-19, $.70 each; 20-49, $.60 each; 50 or more $.50 each; orders under $2. must be accompanied by cash.

CLINICAL DENTAL ROENTGENOLOGY, Technic and Interpretation, Including Roentgen Studies of the Child and the Adolescent, by *John Oppie McCall*, D. D. S., F. A. C. D., and *Samuel Stanley Wald*, D. D. S., F. A. C. D. 4th edition. 466 pages; 1,445 illustrations on 529 figures. W. B. Saunders Co., Philadelphia, Pa., 1957.

THE DOCTOR AS A WITNESS, by *John Evarts Tracy*. 221 pages. W. B. Saunders Co., Philadelphia, Pa., 1957.

THE CIBA COLLECTION OF MEDICAL ILLUSTRATIONS, Volume 3, A Compilation of Paintings on the Normal and Pathologic Anatomy of the DIGESTIVE SYSTEM. Part III, Liver, Biliary Tract and Pancreas. Prepared by *Frank H. Netter*, M. D. Edited by *Ernst Oppenheimer*, M. D. Five sections, XV to XIX. 165 pages; 133 colored plates. Publications Department, CIBA Pharmaceutical Products, Inc., Summit, N. J., 1957. Price $10.50.

THE AMERICAN FLUORIDATION EXPERIMENT, by *F. B. Exner*, M. D., and *G. L. Waldbott*, M. D. Edited by *James Rorty*. 277 pages. The Devin-Adair Co., New York, N. Y., 1957. Price $3.75.

BRAIN MECHANISMS AND DRUG ACTION, A Symposium. Fourth Annual Scientific Meeting of the Houston Neurological Society, Texas Medical Center, Houston, Tex. Compiled and edited by *William S. Fields*. 147 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $4.25.

GYNECOLOGIC THERAPY, by *William Bickers*, M. D. American Lecture Series, Publication No. 302, A Monograph in the Bannerstone Division of American Lectures in Gynecology and Obstetrics, edited by *E. C. Hamblen*, B. S., M. D., F. A. C. S. 158 pages. Charles C Thomas, Publisher, Springfield, Ill., 1957. Price $4.25.

GUIDE TO MEDICAL WRITING, A Practical Manual for Physicians, Dentists, Nurses, Pharmacists, by *Henry A. Davidson*, M. D. 338 pages; illustrated. The Ronald Press Co., New York, N. Y., 1957. Price $5.

HANDBOOK OF LEGAL MEDICINE, by *Louis J. Regan*, M. D., LL. B., and *Alan R. Moritz*, M. D. 201 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1956. Price $3.90.

LIVER: STRUCTURE AND FUNCTION, by *Hans Popper*, M. D., Ph. D., and *Fenton Schaffner*, M. S., M. D. 777 pages; 204 illustrations. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1957. Price $20.

U. S. GOVERNMENT PRINTING OFFICE : 1957 O - 423765